U.S.GOVERNMENT RESEARCH & DEVELOPMENT REPORTS

Vol. 68, No. 10

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INDEXES. Subject, Personal Author, Corporate Author, Contract Number, and Accession/Report Number Indexes are published in the corresponding issue of U.S. GOVERNMENT RESEARCH & DEVELOPMENT REPORTS INDEX (formerly **Government-Wide Index**).

INTRODUCTION

R&D REPORTS AND TRANSLATIONS

U.S. Government Research & Development Reports (USGRDR) is a semi-monthly abstract journal. *USGRDR* announces reports of U.S. Government-sponsored R&D released to the public through the Clearinghouse by the Atomic Energy Commission (AEC), Department of Defense (DoD), National Aeronautics & Space Administration (NASA), and other U.S. Government Departments and Agencies; U.S. Government-sponsored translations; and some foreign reports written in English. Most documents announced in *USGRDR* are for sale to the public.

Translations can be identified in *USGRDR* by accession numbers prefixed by the letters "TT", "JPRS", or by a "PB" number followed by the letter "T"; or by a descriptive note in the cataloging information.

COMPUTER PRODUCED

The journal is produced by computer from machineable records generated by the Clearinghouse, AEC, DoD, and NASA which are converted into compatible machine language and electronically composed at the Government Printing Office.

22 SUBJECT CATEGORIES

In the body of the journal, reports are announced in 22 subject categories called "Fields." Each Field is divided into subcategories called "Groups." The subject arrangement follows the *COSATI Subject Category List* (AD-612 200). An edge index on the back cover provides easy access to the Fields within the journal.

JOURNAL FORMAT

A typical entry includes the title (in bold face type), basic bibliographic information, descriptive terms, an abstract in most cases, the accession number, and price. Sample entries follow.

No abstracts are given at this time for AEC and NASA reports, instead the reader is referred to the journal of original announcement—*Nuclear Science Abstracts (NSA)* or *Scientific & Technical Aerospace Reports (STAR)*. When machine conversion programs are complete, AEC and NASA abstracts will be included.

Descriptors and identifiers provide added subject definition. Descriptors considered of most value appear first in parentheses with their modifiers. Only those descriptors preceded by an asterisk are included in the subject index.

Reports covering more than one subject are announced in the primary field and cross-referenced to other fields.

In the "Research Highlights" section, reports of current high industrial interest are reviewed. These reports may be included in this issue of the journal.

A Locator List at the end of the journal gives the COSATI Field/Group location of each report cited in this issue.

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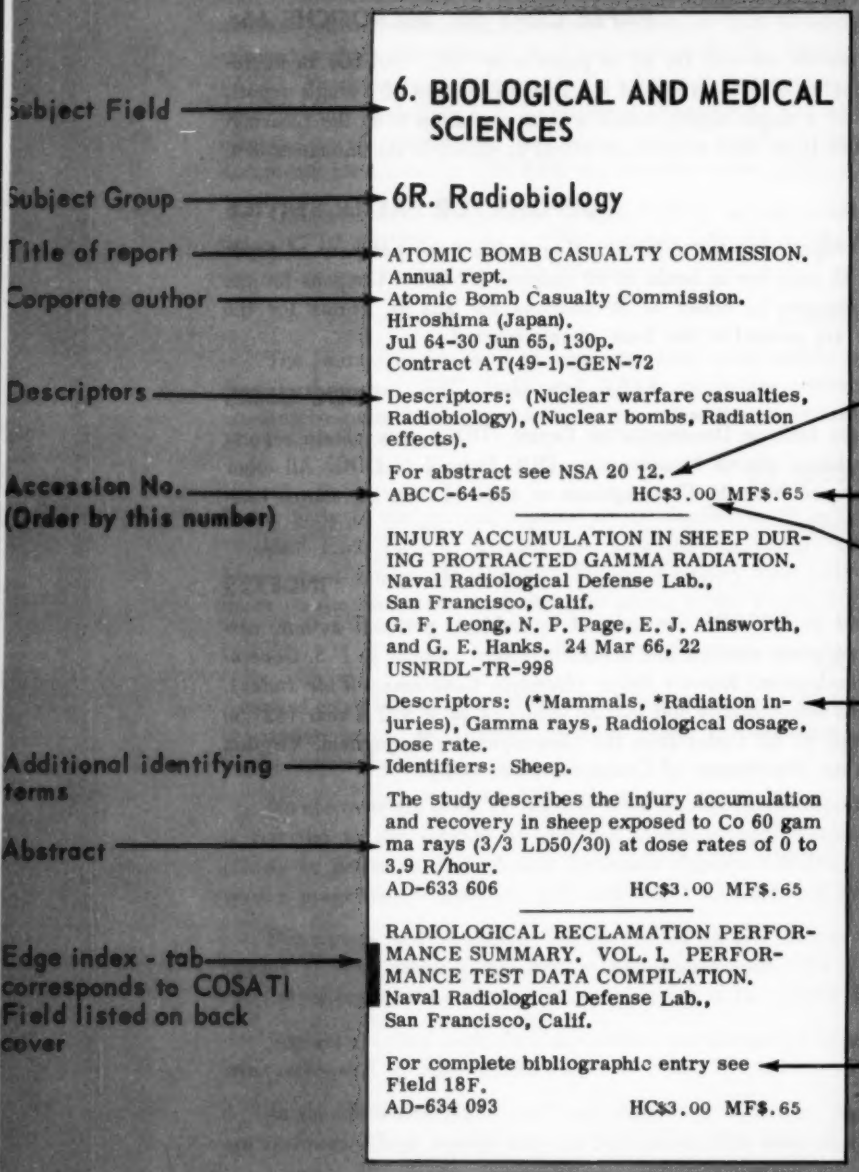
Registered users of the Defense Documentation Center (DDC) may obtain reports in the "AD" series without charge by submitting DDC Form 1 to DDC. All other reports must be purchased from the Clearinghouse or ordered from the source indicated in the journal entry.

INDEXES

All reports announced in *USGRDR* are indexed by subject, personal author, corporate author, contract/grant number, and accession/report number in *U.S. Government Research & Development Reports Index* (formerly *Government-Wide Index).* The Index is published semi-monthly and sold on subscription at $22 a year ($27.50 foreign) or single copy at $3. Order from the Clearinghouse, Springfield, Virginia 22151, or through your Department of Commerce Field Office.

SAMPLE JOURNAL ENTRIES


Subject Field
Subject Group
Title of report
Corporate author
Descriptors
Accession No. (Order by this number)
Additional identifying terms
Abstract
Edge index - tab corresponds to COSATI Field listed on back cover
6. BIOLOGICAL AND MEDICAL SCIENCES
6R. Radiobiology
ATOMIC BOMB CASUALTY COMMISSION. Annual rept.
Atomic Bomb Casualty Commission. Hiroshima (Japan).
Jul 64-30 Jun 65, 130p.
Contract AT(49-1)-GEN-72
Descriptors: (Nuclear warfare casualties, Radiobiology), (Nuclear bombs, Radiation effects).
For abstract see NSA 20 12.
ABCC-64-65 HC$3.00 MF$.65
INJURY ACCUMULATION IN SHEEP DURING PROTRACTED GAMMA RADIATION.
Naval Radiological Defense Lab., San Francisco, Calif.
G. F. Leong, N. P. Page, E. J. Ainsworth, and G. E. Hanks. 24 Mar 66, 22
USNRDL-TR-998
Descriptors: (*Mammals, *Radiation injuries), Gamma rays, Radiological dosage, Dose rate.
Identifiers: Sheep.
The study describes the injury accumulation and recovery in sheep exposed to Co 60 gamma rays (3/3 LD50/30) at dose rates of 0 to 3.9 R/hour.
AD-633 606 HC$3.00 MF$.65
RADIOLOGICAL RECLAMATION PERFORMANCE SUMMARY. VOL. I. PERFORMANCE TEST DATA COMPILATION.
Naval Radiological Defense Lab., San Francisco, Calif.
For complete bibliographic entry see Field 18F.
AD-634 093 HC$3.00 MF$.65
Source journal, volume, and number, Nuclear Science Abstracts (NSA) or Scientific and Technical Aerospace Reports (STAR)
Clearinghouse price (microfiche)
Clearinghouse price (paper copy)
Starred descriptors are indexed in USGRDR INDEX
Cross reference

SUBJECT FIELD AND GROUP STRUCTURE

(Use Edge Index on back cover to locate subject Field in the journal)

FIELD 1. AERONAUTICS

Includes the following Groups: Aerodynamics; Aeronautics; Aircraft; Aircraft Flight Control and Instrumentation; Air Facilities.

FIELD 2. AGRICULTURE

Includes the following Groups: Agricultural Chemistry; Agricultural Economics; Agricultural Engineering; Agronomy and Horticulture; Animal Husbandry; Forestry.

FIELD 3. ASTRONOMY AND ASTROPHYSICS

Includes the following Groups: Astronomy; Astrophysics; Celestial Mechanics.

FIELD 4. ATMOSPHERIC SCIENCES

Includes the following Groups: Atmospheric Physics; Meteorology.

FIELD 5. BEHAVIORAL AND SOCIAL SCIENCES

Includes the following Groups: Administration and Management; Documentation and Information Technology; Economics; History, Law, and Political Science; Human Factors Engineering; Humanities; Linguistics; Man-machine Relations; Personnel Selection, Training, and Evaluation; Psychology (Individual and Group Behavior); Sociology.

FIELD 6. BIOLOGICAL AND MEDICAL SCIENCES

Includes the following Groups: Biochemistry; Bioengineering; Biology; Bionics; Clinical Medicine; Environmental Biology; Escape, Rescue, and Survival; Food, Hygiene and Sanitation; Industrial (Occupational) Medicine; Life Support; Medical and Hospital Equipment; Microbiology; Personnel Selection and Maintenance (Medical); Pharmacology; Physiology; Protective Equipment; Radiobiology; Stress Physiology; Toxicology; Weapon Effects.

FIELD 7. CHEMISTRY

Includes the following Groups: Chemical Engineering; Inorganic Chemistry; Organic Chemistry; Physical Chemistry, Radio and Radiation Chemistry.

FIELD 8. EARTH SCIENCES AND OCEANOGRAPHY

Includes the following Groups: Biological Oceanography; Cartography; Dynamic Oceanography; Geochemistry; Geodesy; Geography; Geology and Mineralogy; Hydrology and Limnology; Mining Engineering; Physical Oceanography; Seismology; Snow, Ice, and Permafrost; Soil Mechanics; Terrestrial Magnetism.

FIELD 9. ELECTRONICS AND ELECTRICAL ENGINEERING

Includes the following Groups: Components; Computers; Electronic and Electrical Engineering; Information Theory; Subsystems; and Telemetry.

FIELD 10. ENERGY CONVERSION (Non-propulsive)

Includes the following Groups: Conversion Techniques; Power Sources; Energy Storage.

FIELD 11. MATERIALS

Includes the following Groups: Adhesives and Seals; Ceramics, Refractories, and Glasses; Coatings, Colorants, and Finishes; Composite Materials; Fibers and Textiles; Metallurgy and Metallography; Miscellaneous Materials; Oils, Lubricants, and Hydraulic Fluids; Plastics; Rubbers; Solvents, Cleaners, and Abrasives; Wood and Paper Products.

FIELD 12. MATHEMATICAL SCIENCES

Includes the following Groups: Mathematics and Statistics; Operations Research.

FIELD 13. MECHANICAL, INDUSTRIAL, CIVIL, AND MARINE ENGINEERING

Includes the following Groups: Air Conditioning, Heating, Lighting, and Ventilating; Civil Engineering; Construction Equipment, Materials, and Supplies; Containers and Packaging; Couplings, Fittings, Fasteners, and Joints; Ground Transportation Equipment; Hydraulic and Pneumatic Equipment; Industrial Processes; Machinery and Tools; Marine Engineering; Pumps, Filters, Pipes, Fittings, Tubing, and Valves; Safety Engineering; Structural Engineering.

FIELD 14. METHODS AND EQUIPMENT

Includes the following Groups: Cost Effectiveness; Laboratories, Test Facilities, and Test Equipment; Recording Devices; Reliability; Reprography.

FIELD 15. MILITARY SCIENCES

Includes the following Groups: Antisubmarine Warfare; Chemical, Biological, and Radiological Warfare; Defense; Intelligence; Logistics; Nuclear Warfare; Operations, Strategy, and Tactics.

FIELD 16. MISSILE TECHNOLOGY

Includes the following Groups: Missile Launching and Ground Support; Missile Trajectories; Missile Warheads and Fuses; Missiles.

FIELD. 17. NAVIGATION, COMMUNICATIONS, DETECTION, AND COUNTERMEASURES

Includes the following Groups: Acoustic Detection; Communications; Direction Finding; Electromagnetic and Acoustic Countermeasures; Infrared and Ultraviolet Detection; Magnetic Detection; Navigation and Guidance; Optical Detection; Radar Detection; Seismic Detection.

FIELD 18. NUCLEAR SCIENCE AND TECHNOLOGY

Includes the following Groups: Fusion Devices (Thermonuclear); Isotopes; Nuclear Explosions; Nuclear Instrumentation; Nuclear Power Plants; Radiation Shielding and Protection; Radioactive Wastes and Fission Products; Radioactivity; Reactor Engineering and Operation; Reactor Materials; Reactor Physics; Reactors (Power); Reactors (Non-power); SNAP Technology.

FIELD 19. ORDNANCE

Includes the following Groups: Ammunition, Explosives, and Pyrotechnics; Bombs; Combat Vehicles; Explosions, Ballistics, and Armor; Fire Control and Bombing Systems; Guns; Rockets; Underwater Ordnance.

FIELD 20. PHYSICS

Includes the following Groups: Acoustics; Crystallography; Electricity and Magnetism; Fluid Mechanics; Masers and Lasers; Optics; Particle Accelerators; Particle Physics; Plasma Physics; Quantum Theory, Solid Mechanics; Solid-state Physics; Thermodynamics; Wave Propagation.

FIELD 21. PROPULSION AND FUELS

Includes the following Groups: Air-breathing Engines; Combustion and Ignition; Electric Propulsion; Fuels; Jet and Gas Turbine Engines; Nuclear Propulsion; Reciprocating Engines; Rocket Motors and Engines; Rocket Propellants.

FIELD 22. SPACE TECHNOLOGY

Includes the following Groups: Astronautics; Spacecraft; Spacecraft Trajectories and Reentry; Spacecraft Launch Vehicles and Ground Support.

RESEARCH highlights

Reports of current high industrial interest

Highlighted documents (unless otherwise noted) are $3.00 each for paper copy and 65 cents for microfiche.

Categories

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Engineering and Construction

THE SHIELDING EFFECTIVENESS OF MATERIALS normally used in the construction of buildings housing electronic equipment has been studied at The Electro-Mechanics Co. The first order parameters of the study were wall materials, configurations, and entry via seams, doors, windows, power lines, and roofing, among others. The most important conclusions reached in the study are as follows: (1) Shadowgraphs of the magnetic field distribution of miniaturized enclosures will show where to place electronic equipment in the enclosure. (2) The use of reinforcing steel rods does not provide the proper degree of homogeneity in a wall to allow good shielding. Expanded metal plates have

good homogeneity; they are also strong and have good bonding characteristics. (3) Ferromagnetic materials are needed for shielding at frequencies below 1 kHz. Conductive sheets or expanses of metals are responsible for shielding at frequencies above several kHz. (4) Dielectric construction materials, such as concrete, brick, stone, and plaster offer no significant shielding at frequencies below 100 MHz. (5) The presence of metal fixtures and furniture in an enclosure can cause apparent shielding which is not homogeneous throughout the enclosure. This can give misleading results in the measurement of the shielding effectiveness of a building or room. ORDER. . . . . AD-667 546 -- EM SHIELDING OF BUILDING MATERIALS. . . . . C. M. Brennan et al., The Electro-Mechanics Co., Austin, Texas, for the Air Force, Feb. 68, 183p.

Social Sciences and Education

FEDERAL EXPENDITURES FOR PROCUREMENT OF GOODS AND SERVICES exert a significant impact on regional economics. The pattern of procurement, moreover, in contrast to conventional fiscal and monetary regulators, is subject to explicit regional variation. In the past, however, Federal procurement decisions have not been influenced by regional development considerations; this fact may be ascribed, in part, to the lack of information relating procurement to regional economic activity. In order to remove this shortcoming, the Office of Economic Research of the Economic Development Administration has sponsored an investigation into this complex and relatively unexplored area. The study covers the economic impact (direct, indirect, and first round consumption) of Federal procurement, and other regionally variable expenditures, on each of the states and on all counties in eight selected states. The study proceeds according to the following steps: (1) develop methods of solution, (2) develop required input data, (3) estimate the impact of procurement, (4) analyze the regional pattern of procurement, (5) test alternate policies, and evaluate procurement as a developmental instrument. ORDER. . . . . PB-177 679 -- REGIONAL FEDERAL PROCUREMENT STUDY. . . . . CONSAD Research Corp., Pittsburgh, Pa., for the Office of Economic Research, Oct. 67, 146p.

PB-177 680 -- APPENDICES TO REGIONAL FEDERAL PROCUREMENT STUDY, VOLUME I, A-G, 485p.

PB-177 681 -- Same Title, VOLUME II, H & I, 436p.

THE FEASIBILITY OF ESTABLISHING A PUBLIC INVESTMENT DATA SYSTEM (PIDS) which would contain data on all public investment expenditures of the Federal, state, and local governments on a county-by-county basis in the United States has been studied at Operations Research Inc. The report of the work is divided into two separate volumes. Volume one contains four sections: a summary of the study effort in terms of the project background; the feasibility of the system; the system concepts; and the recommended implementation approach. The findings derived from the survey of data availability in Federal, state, and local governments, undertaken in support of this effort are included in Appendix A. Appendix B presents a more detailed definition of data availability in terms of proposed PIDS functional elements. Appendix C contains an evaluation of alternative approaches to system implementation. All three appendices are included in Volume two of the report. ORDER. . . . . PB-177 500 -- FEASIBILITY ANALYSIS OF A PUBLIC INVESTMENT DATA SYSTEM VOLUME I. . . . . Operations Research Inc., Silver Spring, Md., for the Office of Regional Development Planning, May 67, 77p.

PB-177 501 -- Same Title, VOLUME II, APPENDICES, 257p.

Printing, Graphic Arts, Photography

A CRANZ-SCHARDIN MULTIPLE SPARK SOURCE PHOTOGRAPHIC SYSTEM having a maximum framing rate of 10^6 frames per second is described in a report prepared at the College of Engineering, University of Michigan. The major components of the system are triggerable air-gap spark light sources, a solid state delay network, a converted portrait camera, associated optics, and mounting hardware. The report describes the uses and limitations of the system; the system can be used in the study of such events as bubble collapse and high-velocity liquid impacts, and in Schleiren or shadowgraph studies. ORDER. . . . . AD-667 386 -- DEVELOPMENT OF A CRANZ-SCHARDIN PHOTOGRAPHIC SYSTEM CAPABLE OF 10^6 FRAMES PER SECOND FOR STUDY OF BUBBLE COLLAPSE AND LIQUID JET IMPACT. . . . . C. L. Kling, Univ. of Michigan, Ann Arbor, for the National Science Foundation and Army Research Office, Jan. 68, 19p.

Human Factors Engineering

NEW MODELS FOR HUMAN PILOT DYNAMICS and new models for pilot/vehicle dynamic analysis have been investigated by workers at Systems Technology, Inc. The pilot modeling topics explored include: low frequency lead generation using either velocity sensing at the periphery (eye) or difference computations accomplished at a more central level; mode-switching models for nonstationary or discrete inputs to the pilot/vehicle system; physiological aspects of pilot dynamics in tracking tasks; and Successive Organization of Perception (SOP) theory for levels of pilot cognition higher than compensatory. For pilot/vehicle analysis, analytical approaches from control theory which appear to have promise are studied, these include the following: (1) time-optional computing feedforward elements useful in the mode-switching models for response to nonstationary inputs; (2) optimal control theory using the crossover models in the performance criterion to estimate pilot response characteristics in compensatory tasks; (3) inverse optimal control theory using known experimental results and quasi-linear pilot response models in an effort to determine the pilot's adjustment rules in terms of performance indices; and (4) optimal control theory to provide a simple test for optimality (to an elementary quadratic criterion) using only average performance measure data. ORDER. . . . . AD-667 549 -- NEW APPROACHES TO HUMAN-PILOT/VEHICLE DYNAMIC ANALYSIS. . . . . D. T. McRuer et al., Systems Technology, Inc., Hawthorne, Calif., for the Air Force, Feb. 68, 207p.

Transportation

THE REPORT OF A SYMPOSIUM ON POWER SYSTEMS FOR ELECTRIC VEHICLES, held at Columbia University, April 6 through 8, 1967, is now available from the Clearinghouse. The report contains 32 papers presented at the Symposium in the following general categories: (1) Problems In Our Cities, including reports on general alternatives to the gasoline engine, the impact of electric vehicles on urban problems, and the impact of the electric power system on urban traffic flow, control, and facilities; (2) Types Of Power Sources, includes reviews of system developments and several kinds of hybrids; (3) Auxiliary Systems, including component developments, and other aspects of the total vehicle system; and (4) Batteries and Fuel Cells, including the status of current research on specific energy-storage systems and how they perform. ORDER. . . . . PB-177 706 -- POWER SYSTEMS FOR ELECTRIC VEHICLES. . . . .H. B. Linford (Chairman), Columbia Univ., New York, N. Y., for U. S. Dept. of Health, Education, and Welfare, 1967, 324p.

Biological and Medical Sciences

A TOTALLY IMPLANTED BIOLOGICAL FUEL CELL operating on reactants derived from the blood stream (carbohydrates and oxygen) has been shown in theory to be a nearly ideal power source for an artificial heart. The major problems involved in developing such a fuel cell have to do with the electrokinetic (electrode catalysts) and mass transfer (electrode structure) limitations in utilizing these reactants at their concentration levels in the blood, and with the compatibility of the fuel cell with the physiological environment. The first problem has been the subject of a year's effort by a team of researchers at the Monsanto Research Corp., and six research tasks have been performed. These tasks, which are described in a report recently received at the Clearinghouse, are as follows: (1) development of chelate catalyzed glucose electrodes; (2) development of alloy-catalyzed glucose electrodes; (3) development of enzyme-catalyzed glucose electrodes; (4) analysis of cathode requirements, design and testing of cathodes; (5) investigation of oxygen reduction in neutral saline solutions; and (6) development of cathode-deoxygenator structure. ORDER. . . . . PB-177 695 -- IMPLANTABLE FUEL CELL FOR AN ARTIFICIAL HEART, FIRST ANNUAL SUMMARY REPORT. . . . . R. F. Drake et al., Monsanto Research Corp., Boston, Mass., for National Heart Inst., Feb. 68, 216p.

R&D REPORTS AND TRANSLATIONS

1. AERONAUTICS

1A. Aerodynamics

TWO-PHASE GAS-LIQUID FLOW DYNAMICS: PART I. FLOW OSCILLATIONS IN TRANSPARENT, PARALLEL, VERTICAL, HEATED CHANNELS. PART II. ACOUSTIC VELOCITY IN TWO-PHASE FLOW.
Massachusetts Inst of Tech Cambridge Engineering Projects Lab
For primary bibliographic entry see Field 20D.
AD-666 618 HC$3.00 MF$0.65

EFFECTS OF RADIATED AERODYNAMIC NOISE ON MODEL BOUNDARY-LAYER TRANSITION IN SUPERSONIC AND HYPERSONIC WIND TUNNELS.
Arnold Engineering Development Center Arnold Air Force Station Tenn
For primary bibliographic entry see Field 22B.
AD-666 644 HC$3.00 MF$0.65

STUDYING FLOW AROUND ELLIPTICAL CONES,
Foreign Technology Div Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 20D.
AD-666 740 HC$3.00 MF$0.65

THE ADDITION OF SECONDARY SHOCK CAPABILITY AND MODIFICATIONS TO THE GASL THREE-DIMENSIONAL CHARACTERISTICS PROGRAM. PART II. USER'S AND PROGRAMMER'S MANUAL.
General Applied Science Labs Inc Westbury N Y
For primary bibliographic entry see Field 20D.
AD-666 742 HC$3.00 MF$0.65

METHODS FOR MEASURING LARGE HEAT FLUXES,
Foreign Technology Div Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 20M.
AD-666 743 HC$3.00 MF$0.65

MEASUREMENT OF AERODYNAMIC DERIVATIVES IN WIND TUNNELS AND IN FLIGHT. PART I. RESEARCH IN WIND TUNNELS. PART II. DETERMINATION IN FLIGHT OF THE AERODYNAMIC COEFFICIENTS OF AN AIRCRAFT BY THE STUDY OF ITS FREQUENCY RESPONSE,
Redstone Scientific Information Center Redstone Arsenal Ala Translation Branch
For primary bibliographic entry see Field 1C.
AD-666 793 HC$3.00 MF$0.65

A METHOD FOR PREDICTING THE TRIM CONSTANTS AND THE ROTOR-BLADE LOADINGS AND RESPONSES OF A SINGLE-ROTOR HELICOPTER.
Cornell Aeronautical Lab Inc Buffalo N Y
For primary bibliographic entry see Field 1C.
AD-666 802 HC$3.00 MF$0.65

THE INCOMPRESSIBLE CONANDA FLOW AROUND CIRCULAR CYLINDER AFFECTED BY SOUND ENERGY.
Catholic Univ of America Washington D C Dept of Mechanical Engineering
For primary bibliographic entry see Field 20D.
AD-666 806 HC$3.00 MF$0.65

ANALYTICAL REVIEW OF MILITARY HELICOPTER FLYING QUALITIES.
Systems Technology Inc Hawthorne Calif
For primary bibliographic entry see Field 1C.
AD-666 827 HC$3.00 MF$0.65

CORRECT FORMULATION OF AIRFOIL PROBLEMS IN MAGNETOAERODYNAMICS.
Cornell Univ Ithaca N Y
For primary bibliographic entry see Field 20I.
AD-666 871 Not available from CFSTI.

PARAMETERS GOVERNING THE GENERATION OF FREE VORTICES.
TRW Systems Redondo Beach Calif
For primary bibliographic entry see Field 4A.
AD-666 890 Not available from CFSTI.

EFFECTS OF NONEQUILIBRIUM AND MASS TRANSFER ON A BLUNT OGIVE PRESSURE DISTRIBUTION.
Arnold Engineering Development Center Arnold Air Force Station Tenn
For primary bibliographic entry see Field 22B.
AD-666 910 HC$3.00 MF$0.65

OBSERVATIONS ON THE INFLUENCE OF AMBIENT PRESSURE ON BOUNDARY-LAYER TRANSITION.
Arnold Engineering Development Center Arnold Air Force Station Tenn
For primary bibliographic entry see Field 20D.
AD-666 911 HC$3.00 MF$0.65

THE NON-SIMILAR BOUNDARY LAYER WITH BLOWING,
Aerospace Corp El Segundo Calif Lab Operations
For primary bibliographic entry see Field 20D.
AD-666 913 HC$3.00 MF$0.65

POSTFLIGHT (AS-202) APOLLO COMMAND MODULE AERODYNAMIC SIMULATION TESTS.
Arnold Engineering Development Center Arnold Air Force Station Tenn
For primary bibliographic entry see Field 22B.
AD-666 927 HC$3.00 MF$0.65

INVESTIGATION OF A TWO-DIMENSIONAL FULLY STALLED TURBULENT FLOW FIELD,
Stanford Univ Calif Thermosciences Div
For primary bibliographic entry see Field 21H.
AD-666 931 HC$3.00 MF$0.65

EXCEEDANCES OF STRUCTURAL INTERACTION BOUNDARIES FOR RANDOM EXCITATION,
Aeronautical Research Associates of Princeton Inc N J
For primary bibliographic entry see Field 1C.
AD-666 942 HC$3.00 MF$0.65

RADIATION COUPLED SHOCK LAYER INCLUDING UPSTREAM ABSORPTION EFFECTS.
Massachusetts Inst of Tech Cambridge Aerophysics Lab
For primary bibliographic entry see Field 22B.
AD-667 009 Not available from CFSTI.

PERTURBATIONS OF PLANE AND AXISYMMETRIC ENTROPY LAYERS.
Cornell Univ Ithaca N Y
For primary bibliographic entry see Field 20D.
AD-667 014 Not available from CFSTI.

WALL TEMPERATURE EFFECT ON INCIPIENT SEPARATION.
Aerospace Research Labs Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 20D.
AD-667 021 Not available from CFSTI.

COMPRESSIBLE LAMINAR MHD FLOW INSIDE A FLAT DUCT WITH HEAT TRANSFER.
Kansas State Univ Manhattan
For primary bibliographic entry see Field 20D.
AD-667 037 Not available from CFSTI.

PRESSURE DISTRIBUTION ON A HYPERSONIC DELTA WING OF DIAMOND CROSS-SECTION,
Douglas Aircraft Co Inc Santa Monica Calif Missile and Space Systems Div
For primary bibliographic entry see Field 1C.
AD-667 066 HC$3.00 MF$0.65

A CHARACTERISTICS APPROACH TO RADIATION GASDYNAMICS,
Massachusetts Inst of Tech Cambridge Dept of Aeronautics and Astronautics
For primary bibliographic entry see Field 22B.
AD-667 097 Not available from CFSTI.

APPROXIMATE ANALYSIS OF LINEARIZED INVISCID RELAXING GAS FLOW,
Massachusetts Inst of Tech Cambridge Aerophysics Lab
For primary bibliographic entry see Field 22B.
AD-667 098 Not available from CFSTI.

STUDY OF TURBULENCE CLOSE TO A SOLID WALL,
Illinois Univ Urbana Dept of Chemistry and Chemical Engineering
For primary bibliographic entry see Field 20D.
AD-667 124 Not available from CFSTI.

INSTABILITY OF RE-ATTACHING FLOWS,
Von Karman Inst for Fluid Dynamics Rhode-Saint-Genese (Belgium)
For primary bibliographic entry see Field 20D.
AD-667 126 Not available from CFSTI.

A SOURCE FLOW MODEL FOR CONTINUUM GAS-PARTICLE FLOW,
Polytechnic Inst of Brooklyn Farmingdale N Y
For primary bibliographic entry see Field 20D.
AD-667 135 Not available from CFSTI.

INTERACTION OF THE LAMINAR BOUNDARY LAYER WITH FREE-STREAM TURBULENCE,
Princeton Univ N J Dept of Aerospace and Mechanical Sciences
For primary bibliographic entry see Field 20D.
AD-667 138 Not available from CFSTI.

A COMPUTER STUDY OF AN ANALYTICAL MODEL OF BOUNDARY LAYER TRANSITION,
Aeronautical Research Associates of Princeton Inc N J
For primary bibliographic entry see Field 20D.
AD-667 157 Not available from CFSTI.

EXPERIMENTAL INVESTIGATION OF SUPERSONIC LAMINAR, TWO-DIMENSIONAL BOUNDARY-LAYER SEPARATION IN A COMPRESSION CORNER WITH AND WITHOUT COOLING.
California Inst of Tech Pasadena Graduate Aeronautical Labs
For primary bibliographic entry see Field 22B.
AD-667 163 Not available from CFSTI.

FAR WAKE BEHIND CYLINDERS AT HYPERSONIC SPEEDS: II. STABILITY.
California Inst of Tech Pasadena Graduate Aeronautical Labs
For primary bibliographic entry see Field 22B.
AD-667 164 Not available from CFSTI.

BOUNDARY-LAYER FLOWS WITH LARGE INJECTION AND HEAT TRANSFER.

California Inst of Tech Pasadena Graduate Aeronautical Labs
For primary bibliographic entry see Field 20D.
AD-667 165 Not available from CFSTI.

EXPERIMENTAL PERFORMANCE EVALUATION OF AN 8.5 INCH (21.59 CM) MEAN-DIAMETER AXIAL FLOW TURBINE AT REYNOLDS NUMBERS FROM 18,000 TO 177,000.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
M. G. Kofskey, and W. J. Nusbaum. Mar 68, 21p NASA-TN-D-4432
Contract 120-27-03-13-22

Descriptors: *Argon, *Axial flow turbines, *Performance tests, *Reynolds number, Aerodynamic characteristics, Experimental design, Inlet pressure.

For abstract, see STAR 06 09.
N68-18501 HC$3.00 MF$0.65

LAMINAR SEPARATION IN HYPERSONIC FLOWS FINAL SCIENTIFIC REPORT, 1 OCT. 1966 - 30 SEP. 1967.
Von Karman Inst. for Fluid Dynamics, Rhode Saint-genese (Belgium).
J. J. Ginoux. 30 Nov 67, 19p VKI-CR-67-GI-I-1, AFOSR-68-0231
Contract AF-EOAR-67-09

Descriptors: *Boundary layer separation, *Conical bodies, *Hypersonic flow, *Laminar boundary layer, Flow visualization, Gas injection, Heat transfer, Pressure distribution, Reattached flow, Wind tunnel models, Zero angle of attack.

For abstract, see STAR 06 09.
N68-18612 HC$3.00 MF$0.65

COMPUTING PROGRAM FOR AXIAL DISTRIBUTION OF AERODYNAMIC NORMAL-FORCE CHARACTERISTICS FOR AXISYMMETRIC MULTISTAGE LAUNCH VEHICLES.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
For primary bibliographic entry see Field 22D.
For abstract, see STAR 06 09.
N68-18615 HC$3.00 MF$0.65

COMPARISON OF THE MACH 3.0 AERODYNAMIC CHARACTERISTICS OF TENSION STRING, TENSION SHELL, AND 120 DEG CONIAL SHAPES.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
J. W. Sawyer. Mar 68, 30p NASA-TN-D-4360

Descriptors: *Aerodynamic characteristics, *Conical shells, *Drag devices, *Stressed-skin structures, *Supersonic flow, Aerodynamic coefficients, Angle of attack, Flow distribution, Schlieren photography, Separated flow, Static stability, Wind tunnel models.

For abstract, see STAR 06 09.
N68-18720 HC$3.00 MF$0.65

AN EXPERIMENTAL STUDY OF THE INFLUENCE OF THE TURBULENT BOUNDARY LAYER ON PANEL FLUTTER.
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
P. A. Gaspers, Jr., L. Muhlstein, Jr., and D. W. Riddle. Mar 68, 55p NASA-TN-D-4486

Descriptors: *Dynamic pressure, *Panel flutter, *Resonant frequencies, *Turbulent boundary layer, Atmospheric density, Flat plates, Rectangular panels, Stiffness, Supersonic flow, Temperature effects, Transonic wind tunnels.

For abstract, see STAR 06 09.
N68-18721 HC$3.00 MF$0.65

AERODYNAMIC CHARACTERISTICS FOR CONE CYLINDER FRUSTRUM CYLINDER CONFIGURATIONS AT MACH NUMBERS FROM 0.7 TO 1.96. VOLUME 1 - LINEAR LOAD DISTRIBUTIONS.
Lockheed Missiles and Space Co., Huntsville, Ala. Research and Engineering Center.
J. F. Thompson. 23 Nov 66, 156p NASA-CR-61626, LMSC/HREC-A783468, V. 1
Contract NAS8-20121

Descriptors: *Aerodynamic characteristics, *Conical bodies, *Frustums, *Moment distribution, Aerodynamic configurations, Loads (forces), Subsonic speed, Supersonic speeds, Transonic speed.

For abstract, see STAR 06 09.
N68-18765 HC$3.00 MF$0.65

DYNAMIC STABILITY OF SPACE VEHICLES. VOLUME 7 - THE DYNAMICS OF LIQUIDS IN FIXED AND MOVING CONTAINERS.
General Dynamics Corp., San Diego, Calif.
For primary bibliographic entry see Field 22C.
For abstract, see STAR 06 09.
N68-18769 HC$3.00 MF$0.65

LARGE-SCALE WIND-TUNNEL TESTS OF A DEFLECTED SLIPSTREAM STOL MODEL WITH WINGS OF VARIOUS ASPECT RATIOS.
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
For primary bibliographic entry see Field 1C.
For abstract, see STAR 06 09.
N68-18771 HC$3.00 MF$0.65

RECENT DEVELOPMENTS IN WIND TUNNEL MEASUREMENTS OF AERODYNAMIC DERIVATIVES.
Progres Realises Dans les Techniques de Mesure des Derivees Aerodynamiques en Soufflerie Methode D'oscillations Forcees
National Aeronautics and Space Administration, Washington, D. C.
J. Lopez, and M. Scherer. Mar 68, 33p NASA-TT-F-11510, ONERA-TP-389
Tran- Transl. Into English From Onera-tp-389

Descriptors: *Aerodynamic coefficients, *Dynamometers, *Strain gage accelerometers, *Wind tunnel apparatus, Breguet 941 aircraft, Electronic equipment, Harmonic analysis, Wind tunnel models.

For abstract, see STAR 06 09.
N68-18815 HC$3.00 MF$0.65

CONICAL BODIES OF GIVEN LENGTH AND VOLUME HAVING MAXIMUM LIFT-TO-DRAG RATIO AT HYPERSONIC SPEEDS - DIRECT METHODS.
Rice Univ., Houston, Tex. Dept. of Mechanical and Aerospace Engineering and Materials Science.
J. C. Heideman, A. Miele, and R. E. Pritchard. 1967, 50p NASA-CR-66572, AAR-34
Contract NGR-44-006-063

Descriptors: *Aerodynamic stability, *Hypersonic speed, *Lift drag ratio, *Slender cones, *Surface geometry, Contours, Dynamic stability, Flat surfaces, Lenticular bodies, Longitudinal stability, Low aspect ratio wings, Numerical analysis, Performance prediction, Shapes, Surfaces, Swept wings, Transient response.

For abstract, see STAR 06 09.
N68-18830 HC$3.00 MF$0.65

PRELIMINARY TESTS WITH MASS FLUX PROBE IN SUPERSONIC STREAM.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
For primary bibliographic entry see Field 14B.
For abstract, see STAR 06 09.
N68-18834 HC$3.00 MF$0.65

FORCES AND MOMENTS PRODUCED BY AIR AND HELIUM JETS EXHAUSTING PARALLEL TO A FLAT PLATE IN A NEAR VACUUM.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
S. Hoffman, and J. J. Janos. Mar 68, 40p NASA-TN-D-4408
Contract 125-19-03-10-23

Descriptors: *Air jets, *Conical nozzles, *Flat plates, *Jet impingement, *Pitching moments, Angles (geometry), Helium, Jet flow, Nozzle flow, Nozzle thrust coefficients, Pressure effects, Vacuum effects.

For abstract, see STAR 06 09.
N68-19000 HC$3.00 MF$0.65

STABILITY OF ONE-DIMENSIONAL COMPRESSIBLE FLOWS.
Israel Inst. of Tech., Haifa. Dept. of Aeronautical Engineering.
E. Wasserstrom. Sep 67, 24p TAE-74

Descriptors: *Flow stability, *Fluid flow, *Incompressible flow, *One dimensional flow, Cartan space, Entropy, Inviscid flow, Numerical analysis, Perturbation theory.

For abstract, see STAR 06 09.
N68-19003 HC$3.00 MF$0.65

FUNDAMENTALS OF THE AERODYNAMICS OF HYPERSONIC VELOCITIES.
Osnovy Aerodinamiki Giperzvukovykh Skorostey
Techtran Corp., Glen Burnie, Md.
N. S. Arzhanikov, and G. S. Sadekova. Mar 68, 59p NASA-TT-F-11457
Contract NASW-1695
Coll- 59 P Tran- Transl. Into English From the Book "aerodinamika Bol'shikh Skorostey" Moscow, Izd. Vysshaya Shkola, 1965 P 348-409

Descriptors: *Aerodynamic characteristics, *Boundary layer flow, *Hypersonic flow, *Shock wave interaction, Blunt bodies, Conical bodies, Flat plates, Gas dissociation, Pressure distribution, Separated flow, Thermodynamic equilibrium.

For abstract, see STAR 06 09.
N68-19022 HC$3.00 MF$0.65

FUNDAMENTALS IN THE THEORY OF A WING PROFILE IN A SUPERSONIC FLOW.
Techtran Corp., Glen Burnie, Md.
For primary bibliographic entry see Field 1C.
For abstract, see STAR 06 09.
N68-19023 HC$3.00 MF$0.65

THEORY OF A WING WITH FINITE SPAN IN SUPERSONIC FLOW.
Techtran Corp., Glen Burnie, Md.
For primary bibliographic entry see Field 1C.
For abstract, see STAR 06 09.
N68-19024 HC$3.00 MF$0.65

TURBULENT BOUNDARY LAYER OF A DISSOCIATED GAS AT THE INLET SECTION OF A TUBE.
Turbulentnyy Pogranichnyy Sloy Dissotsiirovannogo Gaza V Nachal'nom Uchastkye Truby
Aztec School of Languages, Inc., Acton, Mass. Research Translation Div.
A. V. Fafurin, A. N. Leontev, and B. P. Mironov. Mar 68, 11p NASA-TT-F-11254

Contract NASW-1692
Coll- 11 P Refs Tran- Transl. Into English From Zh. Prikl. Mekhan. I Tekhn. Fiz. (Moscow), No. 8, 1967 P 100-105

Descriptors: *Gas dissociation, *Inlet flow, *Pipe flow, *Turbulent boundary layer, Friction, Gas flow, Gas mixtures, Heat transfer, Numerical analysis, Subsonic flow.

For abstract, see STAR 06 09.
N68-19026 HC$3.00 MF$0.65

THREE-FRONT CONFIGURATIONS WITH ENERGY ADDITION.
Royal Aircraft Establishment, Farnborough (England).
D. Rues. Nov 67, 26p RAE-LIB-TRANS-1260
Tran- Transl. Into English From German Report Conf- Presented At the 3d Euromech. Symp., Aachen, 1966

Descriptors: *Discontinuity, *Shock fronts, *Supersonic flow, *Thermal energy, Flow distribution, Flow equations, Shock waves.

For abstract, see STAR 06 09.
N68-19058 HC$3.00 MF$0.65

EFFECT OF TWO-DIMENSIONAL MULTIPLE SINE-WAVE PROTRUSIONS OF THE PRESSURE AND HEAT-TRANSFER DISTRIBUTIONS FOR A FLAT PLATE AT MACH 6.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
A. M. Cary, Jr., and E. L. Morrisette. Mar 68, 57p NASA-TN-D-4437
Contract 129-01-08-41-23

Descriptors: *Flat plates, *Heat transfer, *Pressure distribution, *Sine waves, *Surface distortion, Aerodynamic heating, Flow visualization, Hypersonic flow, Laminar flow, Surface roughness, Turbulent flow, Wind tunnel models.

For abstract, see STAR 06 09.
N68-19063 HC$3.00 MF$0.65

WING SURFACE PRESSURE DATA FROM LARGE-SCALE WIND-TUNNEL TESTS OF A PROPELLER-DRIVEN STOL MODEL.
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
For primary bibliographic entry see Field 1C.
For abstract, see STAR 06 09.
N68-19065 HC$3.00 MF$0.65

FLUTTER OF CORRUGATION STIFFENED PANELS AT MACH 3 AND COMPARISON WITH THEORY.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
H. L. Bohon. Mar 68, 29p NASA-TN-D-4321
Contract 126-14-02-23-23

Descriptors: *Flutter analysis, *Panel flutter, *Structural vibration, *Supersonic flutter, Aerodynamic stability, Aeroelasticity, Reinforcement (structures), Structural analysis, Thermal buckling, Vibration tests.

For abstract, see STAR 06 09.
N68-19143 HC$3.00 MF$0.65

ANALOG STUDY OF THE LONGITUDINAL RESPONSE OF A SWEPT-WING TRANSPORT AIRPLANE TO WIND SHEAR AND SUSTAINED GUSTS DURING LANDING APPROACH.
National Aeronautics and Space Administration. Research Center, Moffett Field, Calif.
For primary bibliographic entry see Field 1B.
For abstract, see STAR 06 09.
N68-19180 HC$3.00 MF$0.65

LARGE-SCALE WIND-TUNNEL TESTS OF AN AIRPLANE MODEL WITH TWO PROPELLERS AND ROTATING CYLINDER FLAPS.
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
B. Gamse, and J. A. Weiberg. Mar 68, 49p NASA-TN-D-4489
Contract 721-01-00-12-00-21

Descriptors: *Aerodynamic characteristics, *Flaps (control surfaces), *Turboprop engines, *Wind tunnel stability tests, Aerodynamic drag, Aircraft stability, Airfoils, Angle of attack, Leading edge slats, Lift drag ratio, Wind tunnel models, Wing profiles.

For abstract, see STAR 06 09.
N68-19189 HC$3.00 MF$0.65

RECENT STUDIES OF NONEQUILIBRIUM FLOWS AT THE CORNELL AERONAUTICAL LABORATORY.
Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
For primary bibliographic entry see Field 20D.
For abstract, see STAR 06 09.
N68-19190 HC$3.00 MF$0.65

PROGRESS IN DEVELOPING HIGH ENERGY NOZZLE BEAMS.
Toronto Univ. (Ontario). Inst. for Aerospace Studies.
J. B. French, and G. E. Mc Michael. 1966, 9p NASA-CR-77847
Grant NSG-367
Conf- Presented At the 5th Intern. Rarefied Gas Dyn. Symp., Oxford, Jul. 1966

Descriptors: *Electron beams, *Jet flow, *Molecular beams, *Nozzle flow, Free jets, Free molecular flow, Gas density, Knudsen flow, Molecular flow, Rarefied gas dynamics.

For abstract, see STAR 06 09.
N68-19265 HC$3.00 MF$0.65

EFFECT OF BOATTAIL JUNCTURE SHAPE ON PRESSURE DRAG COEFFICIENTS OF ISOLATED AFTERBODIES.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
G. D. Shrewsbury. Mar 68, 34p NASA-TM-X-1517
Contract 720-03-01-08-22

Descriptors: *Aerodynamic coefficients, *Afterbodies, *Boattails, *Nacelles, *Pressure drag, Aerodynamic configurations, Conical bodies, Flow distribution, Flow geometry, Nozzle flow, Supersonic flow, Wind tunnel models.

For abstract, see STAR 06 09.
N68-19237 HC$3.00 MF$0.65

MEASUREMENT OF AERODYNAMIC DERIVATIVES IN WIND TUNNELS AND IN FLIGHT. PART 1 - RESEARCH IN WIND TUNNELS. PART 2 - DETERMINATION IN FLIGHT OF THE AERODYNAMIC COEFFICIENTS OF AN AIRCRAFT BY THE STUDY OF ITS FREQUENCY RESPONSE.
National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
P. Mathe, and M. Scherer. 23 Dec 67, 60p NASA-TM-X-60930, RSIC-738
Sci. Inform. Center Date- 23 Dec. 1967 Coll- 60 P Refs Conf- Agard Fluid Dyn. and Flight Mech. Panels Meeting of Specialists on Stability and Control, Rhode-saint-genese, Belgium, 10-14 Apr. 1961 Spon- Sponsored Jointly By Nasa and Army Missile Command

Descriptors: *Aerodynamic coefficients, *Dynamic response, *In-flight monitoring, *Subsonic wind tunnels, *Supersonic wind tunnels, Flight tests, Forced vibration, Free vibration, Hypersonic flow, Rotation.

For abstract, see STAR 06 09.
N68-19350 HC$3.00 MF$0.65

PLANE-FLAME SIMULATION OF THE WAKE BEHIND AN INTERNALLY PROPELLED VEHICLE. PART III. EXPERIMENTAL SIMULATION OF A SUPERSONIC VEHICLE BY A DETONATION.
Rensselaer Polytechnic Inst., Troy, N. Y. Dept. of Aeronautical Engineering and Astronautics.
For primary bibliographic entry see Field 20D.
PB-176 924 HC$3.00 MF$0.65

1B. Aeronautics

DESIGN STUDY AND MODEL STRUCTURES TEST PROGRAM TO IMPROVE FUSELAGE CRASHWORTHINESS.
General Dynamics/Convair San Diego Calif
For primary bibliographic entry see Field 1C.
AD-666 816 HC$3.00 MF$0.65

SIMULATION AND ANALYSIS OF OVER-OCEAN SEPARATION ASSURANCE PROCEDURES AND DISPLAYS.
National Aviation Facilities Experimental Center Atlantic City N J
For primary bibliographic entry see Field 1C.
AD-666 829 HC$3.00 MF$0.65

ANALOG STUDY OF THE LONGITUDINAL RESPONSE OF A SWEPT-WING TRANSPORT AIRPLANE TO WIND SHEAR AND SUSTAINED GUSTS DURING LANDING APPROACH.
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
C. T. Snyder. Apr 68, 20p NASA-TN-D-4477
Contract 126-16-05-07-00-21

Descriptors: *Approach control, *Computerized simulation, *Gust loads, *Longitudinal stability, *Wind shear, Aircraft stability, Analog computers, Attitude control, Dynamic response, Flight paths, Flight simulation, Swept wings, Time functions, Transport aircraft.

For abstract, see STAR 06 09.
N68-19180 HC$3.00 MF$0.65

RESEARCH APPROACHES TO ALLEVIATION OF AIRPORT-COMMUNITY NOISE.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
W. L. Copeland, H. H. Hubbard, and D. J. Maglieri. 6 May 66, 36p NASA-TM-X-57689
Conf- Presented At the Inaugural Meeting of the Brit. Acoust. Soc., London, 6 May 1966

Descriptors: *Airport planning, *Engine noise, *Jet aircraft noise, *Noise reduction, *Sonic booms, Climbing flight, Human tolerances, Landing, Noise intensity, Noise propagation, Noise tolerance, Takeoff.

For abstract, see STAR 06 09.
N68-19212 HC$3.00 MF$0.65

AIRCRAFT ACCIDENT REPORT. LAKE CENTRAL AIRLINES, INC. ALLISON PROP-JET CONVAIR 340 N73130, NEAR MARSEILLES, OHIO MARCH 5, 1967.
National Transportation Safety Board, Washington, D. C.
26 Feb 68, 35p
Also available on subscription $12.00/yr, $15.00/yr foreign. See also PB-177 339-1.

Descriptors: (*Aviation accidents, *Commercial planes), (*Damage assessment, Reports), Transport planes, History, Casualties, Analysis, Meteorological parameters, Flight instruments, Casualties, Models (Simulations), Performance (Engineering), Ohio, Propellers (Aerial), Fuselages, Failure (Mechanics), Communication systems, Test methods.

Identifiers: Convair-340 aircraft, Marseilles (Ohio).

About 2007 e.s.t., on March 5, 1967, a Prop-Jet Convair 340 crashed near Marseilles, Ohio. The 38 persons aboard the aircraft received fatal injuries. The aircraft was destroyed. Investigation revealed that all four blades of the right propeller separated in flight and the No. 2 blade penetrated the aircraft fuselage in line with the propeller plane. The penetrations destroyed the structural integrity of the fuselage to an extent that, together with the loads caused by a right yaw which accompanied the propeller separation, the fuselage failed along the line of penetrations and the aircraft crashed. (Author)
PB-177 339 HC$3.00 MF$0.65

AIRCRAFT ACCIDENT REPORT. AIRLIFT INTERNATIONAL, INC. DOUGLAS DC-7C, N2282 TACHIKAWA AIR BASE, TOKYO, JAPAN SEPTEMBER 12, 1966.
National Transportation Safety Board, Washington, D. C.
26 Feb 68, 21p
Available on subscription $12.00/yr, $15.00/yr foreign.

Descriptors: (*Aviation accidents, *Commercial planes), (*Damage assessment, Reports), Jet transport planes, Meteorological parameters, Fire, Load distribution, Survival, Analysis, Navigation, Cargo, Takeoff, Transport planes, Aviation injuries, Casualties, Japan, Failure (Mechanics).
Identifiers: Douglas DC-7C aircraft, Tokyo (Japan).

On September 12, 1966, at approximately 2201 (Japan local time), a Douglas DC-7C, initiated takeoff from Runway 01 at Tachikawa Air Base, Japan. The flight was carrying 27,484 pounds of cargo and was bound for Wake Island. The takeoff was aborted following unsuccessful attempts to rotate the aircraft. However, efforts to stop the aircraft were unsuccessful and it overran the runway, went through a perimeter fence, and came to rest in a field approximately 700 feet north of the airport. Two of the four crewmembers were injured. The aircraft was damaged substantially by impact and was partially destroyed by subsequent fire. (Author)
PB-177 339-1 HC$3.00 MF$0.65

AIRCRAFT ACCIDENT REPORT, LEXINGTON AIR TAXI, INC. BEECH C-45H, N3727G NEAR BLUE GRASS FIELD LEXINGTON, KENTUCKY, APRIL 3, 1967.
National Transportation Safety Board, Washington, D. C.
13 Mar 68, 29p
Also available on subscription, $12.00/yr, $15.00/yr foreign.

Descriptors: (*Aviation accidents, *Commercial planes), Civil aviation, Take-off, Angle of attack, Spin, Impact, Damage, Aviation injuries, Analysis, Aerodynamic loading, Aircraft fires, Aircraft engines, Kentucky.
Identifiers: Light planes, Beech C-45H aircraft, Lexington (Kentucky), Airplane crashes.

The aircraft was observed after takeoff climbing slowly on runway heading in a nose-high attitude. At an altitude of between 200 and 300 feet the aircraft settled slightly, entered a left rotational spin, and crashed in an open field approximately 4,000 feet from the departure end of Runway 33. Witnesses reported seeing black smoke emanating from the underside of the aircraft just prior to impact. All nine persons on board, the pilot and eight passengers, received fatal injuries. The aircraft was destroyed by impact and subsequent fire. (Author)
PB-177 339-2 HC$3.00 MF$0.65

1C. Aircraft

LIFT FAN FLIGHT RESEARCH AIRCRAFT.
Quarterly Technical Progress rept. no. 10, 17 Feb-15 May 64.
General Electric Co., Cincinnati, Ohio.
Jul 64, 94p
Contract DA-44-177-TC-715

Descriptors: (*Vertical take off planes, Research program administration), (*Research planes, Research program administration), Short take off planes, Turbojet engines, Ducted fans, Spare parts, Modification kits, Captive tests, Wind tunnel models, Design, Loading (Mechanics), Actuators, Flight testing, Nose wheels, Taxing, Landing gear, Malfunctions, Lift, Corrections, Ejection seats, Resonance, Instrumentation, Maintenance, Stability, Flight control systems, Structural properties, Temperature, Reliability, Hovering, Simulation, Weight, Flutter.
Identifiers: V-5 aircraft, J-85 engines, Louvers, Lift engines.

Propulsion system deliveries were completed with acceptance of the last spare lift fan. Fan speed VTOL and CTOL flight clearance was requested and granted for A/C number two. Lift fan and J85 spare parts were shipped to Edwards Air Force Base. Number one A/C completed modification and ground tests at NASA-Ames prior to full scale wind tunnel tests. Engineering design and analysis was completed for the higher loading in the exit louver actuation system. Both aircraft completed systems functional tests at San Diego. A/C number two was shipped to Edwards AFB to begin flight tests and A/C number one was shipped to NASA-Ames for wind tunnel testing. Nose wheel shimmy encountered during taxi tests causing aircraft damage. Nose gear redesign and successful dynamic and static tests were completed. A systems failure evaluation was conducted on the flight simulator to establish emergency procedures. A/C damage as a result of nose gear failure was corrected.
AD-461 017 HC$3.00

ANNUAL CONFERENCE ON WEATHER EFFECTS ON AIRCRAFT SYSTEMS (2ND). A COMPILATION OF THE PAPERS PRESENTED SEPTEMBER 18 AND 19, 1962.
Naval Air Turbine Test Station, Trenton, N. J. Aeronautical Turbine Lab.
For primary bibliographic entry see Field 4B.
AD-461 803 HC$3.00

DEVELOPMENT OF LUBRICANT SCREENING TESTS AND EVALUATION OF LUBRICANTS FOR GAS TURBINE ENGINES FOR COMMERCIAL SUPERSONIC TRANSPORT.
Southwest Research Inst., San Antonio, Tex.
For primary bibliographic entry see Field 11H.
AD-467 236 HC$3.00 MF$0.65

A SIMPLIFIED TECHNIQUE FOR THE SYNTHESIS OF MODEL-REFERENCED ADAPTIVE CONTROL SYSTEMS.
Stanford Univ., Calif. Stanford Electronics Lab.
For primary bibliographic entry see Field 16D.
AD-483 444 HC$3.00 MF$0.65

FLIGHT SIMULATION STUDY OF AIR-TO-AIR RANGING DISPLAYS FOR SEPARATION ASSURANCE.
Roman M. /Spangler ;Richard L. /Sulzer
National Aviation Facilities Experimental Center Atlantic City N J
Feb 68, 27p Rept no. NA-68-13
FAA-RD-66-83

Descriptors: (*Commercial planes, Warning systems), (*Warning systems, *Display systems), Air-to-air, Separation, Flight simulators, Cockpits, Aviation safety, Monitors, Instrument panels, Flight paths, Approach, Air traffic, Performance (Engineering), Range finding, Ranges (Distance).
Identifiers: *Distance measuring equipment, Stationkeeping, *Collision avoidance.

Three flight simulation tests assessed the operational value for separation assurance of cockpit display of: (a) warning that another aircraft has intruded within 60 miles, plus constant display of intruder range; (b) the same warning and present range, plus pilot-to-pilot communications; and (c) the warning and present range, plus relative bearing of the intruder, without communications. All three added displays were adquate for overtaking intrusions with no one method very superior to the others. Head-on and beam intrusions produced less assurance. Potentially serious errors of interpretation occurred with all three displays in high closure rate head-ons. (Author)
AD-666 620 HC$3.00 MF$0.65

ELECTROPLATED NICKEL RAIN EROSION RESISTANT COATING.
Air Force Materials Lab Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 11C.
AD-666 674 HC$3.00 MF$0.65

COMPARATIVE ANALYSIS OF ARMY AVIATION MAINTENANCE CONCEPTS.
American Power Jet Co Ridgefield N J
Sep 67, 237p Rept no. APJ-483-2
Contract DA-42-092-ARO-161

Descriptors: (*Army aircraft, Maintenance), Operational readiness, Airmobile operations, Maintenance personnel, Cost effectiveness, Job analysis, Helicopters, Manpower studies, Tactical air support, Response, Limited war, Vietnam, Combat readiness, Military personnel, Military requirements, Spare parts.
Identifiers: H-1 aircraft, UH-1 aircraft, H-47 aircraft, CH-47 aircraft.

The objective of the study is to accomplish, in the context of recent Army experience in Vietnam, a comparative evaluation of the three principal concepts of Direct Support level aircraft maintenance: (1) The Conventional Direct Support (DS) concept as employed by the ROAD Infantry Divisions, (2) The Airmobile concept as employed by the 1st Cavalry Division (Airmobile), (3) The DS Detachment concept as practiced in the aviation companies of the 1st Aviation Brigade. Findings and recommendations derived from this evaluation are furnished to provide bases for decisions on the optimum concepts for this important aspect of management of Army Aviation resources. These concepts are analyzed in terms of: (1) Effectiveness, as reflected in reported aircraft readiness and utilization. (2) Efficiency of support operations as indicated by NORM (Not Operationally Ready, Maintenance) rates, NORS (Not Operationally Ready, Supply) rates, supply performance and ratio of manpower to aircraft supported. (3) Investments in resources to include equipment, personnel, facilities, and parts stockage. The report describes the structure of the problem, the evaluation parameters, and the results of the analysis. (Author)
AD-666 745 HC$3.00 MF$0.65

VALUE ENGINEERING FINAL REPORT FOR LIGHT OBSERVATION HELICOPTER AVIONICS PACKAGE.
Final rept. 21 Jan 66-21 Jan 68,
Sylvania Electronic Systems-Central Williamsville N Y
James B. Allis, and Walter Serniuk. Jan 68, 16p
ECOM-01943-7
Contract DA-28-043-AMC-01943 (E)

Descriptors: (*Helicopters, Aircraft equipment), (*Aircraft equipment, *Value engineering), Cost effectiveness, Research program administration, Manpower studies, Training, Production, Radio communication systems, Inertial navigation.
Identifiers: *Light observation helicopter avionics package, Avionics.

Accomplishments achieved during the report period are summarized. The following topics are included: Program Management Office, time expended, inherent value engineering changes, subcontractors, VE training and orientation, advance

production engineering, and recommendations.
AD-666 792 HC$3.00 MF$0.65

MEASUREMENT OF AERODYNAMIC DERIVATIVES IN WIND TUNNELS AND IN FLIGHT. PART I. RESEARCH IN WIND TUNNELS. PART II. DETERMINATION IN FLIGHT OF THE AERODYNAMIC COEFFICIENTS OF AN AIRCRAFT BY THE STUDY OF ITS FREQUENCY RESPONSE.
Redstone Scientific Information Center Redstone Arsenal Ala Translation Branch
M. Scherer, and P. Mathe. 23 Dec 67, 62p
RSIC-738
Paper no. 346 Presented at the meeting of AGARD Specialists on Stability and Control, 10-4 Apr 61, Rhode-Saint-Genese, Belgium.

Descriptors: (*Airframes, Aerodynamic characteristics), Airplane models, Wind tunnel models, Model tests, Flight testing, Oscillation, Subsonic characteristics, Supersonic characteristics, Hypersonic characteristics, Frequency, France, Rotation, Response, Measurement, Reports.
Identifiers: Translations.

The first part of this report, which concerns wind tunnel research on aerodynamic derivatives, amplifies previous overall studies by examining critically the methods and facilities generally used at the present time for such work. Some progress is reported and some results thus made possible are presented. The second part is devoted to flight tests undertaken by a French firm after development of prototype apparatus. (Author)
AD-666 793 HC$3.00 MF$0.65

INVESTIGATION OF COORDINATED FREE TURBINE ENGINE CONTROL SYSTEMS FOR MULTIENGINE HELICOPTERS.
Final rept. 2 Dec 66-15 Jul 67,
General Motors Corp Indianapolis Ind Allison Div
Robert M. Swick, and Charles A. Skarvan. Dec 67, 159p Rept no. EDR-5298
USAAVLABS-TR-67-73
Contract DAAJ02-67-C-0009

Descriptors: (*Helicopters, *Gas turbines), (*Helicopter engines, Control systems), Malfunctions, Automatic, Helicopter rotors, Performance (Engineering), Aviation safety, Design, Optimization, Aviation fuels.
Identifiers: Closed-loop control systems, Multiengine helicopters, Computer simulation.

Various multiengine helicopter control concepts were analyzed and evaluated to determine an optimum system design to relieve engine monitoring during critical flight maneuvers. Power turbine governing mode evaluations showed that a proportional power turbine governor with a lagged gain reset (feedback) is desirable. Governing stability was based on a linearized representation of the engine-controls-rotor system and included both Bode diagram analysis and analog simulation. Power transient response was evaluated by using a nonlinearized digital computer simulation of the different modes and the engine and rotor system, with collective load transients imposed. The gas producer control requirements found necessary were automatic start sequencing, closed-loop steady-state turbine temperature limiting, emergency power operation capability with both manual and automatic selection, and governing action using a gas producer control fuel metering valve. Isochronous control of power turbine speed was evaluated and found to be a feasible alternative to collective pitch lever coordination of the power turbine governors. The isochronous speed control also was found to cause potentially undesirable speed excursions during collective induced power transients. The multiengine governing-load sharing concept selected utilized individual governors for each engine, with closed-loop load sharing control and an automatic engine malfunction detector. A digital computer simulation of promising control schemes and a multiengine-helicopter power system was developed and utilized in steady-state and transient analyses. (Author)
AD-666 796 HC$3.00 MF$0.65

A METHOD FOR PREDICTING THE TRIM CONSTANTS AND THE ROTOR-BLADE LOADINGS AND RESPONSES OF A SINGLE-ROTOR HELICOPTER.
Final rept. Feb 66-Jul 67,
Cornell Aeronautical Lab Inc Buffalo N Y
T. T. Chang. Nov 67, 107p Rept no. CAL-BB-2205-S-1
USAAVLABS-TR-67-71
Contract DA-44-177-AMC-384 (T)

Descriptors: (*Helicopters, Performance (Engineering)), (*Rotor blades (Rotary wings), Aerodynamic characteristics), Aerodynamic loading, Response, Mathematical prediction, Wake, Tail helicopter rotors, Torsion, Equations of motion, Moments, Computer programs, Flow charting.
Identifiers: H-1 aircraft, UH-1A aircraft, H-34 aircraft, Trim (Aircraft), Computer analysis, *Bending moments.

The present effort was undertaken to extend the previously developed method by (1) including the blade inplane and torsional motions, and (2) treating the four trim constants (namely, the blade pitch-control settings and the rotor-shaft tilt angle) as unknowns. The trim constants are different for different flight conditions and are determined through the use of four appropriate, average equilibrium conditions of the helicopter. These equilibrium conditions are called the trim equations and are derived in the report, taking into account the inertial forces of the blades due to elastic deformations. Lagrange's equations for the blade motions are given. The generalized coordinates employed in these equations to represent blade bending are those which have deflection components in two mutually perpendicular directions. Orthogonality relations of vibration modes of twisted, rotating blades are derived and are used in simplifying the equations of blade motion. A successive approximation procedure was developed which, upon incorporation with the previously developed iterative procedure, yields the aerodynamic loads, the blade responses, and the required trim constants. Computed results are obtained for the UH-1A rotor at advance ratios of 0.26 and 0/08 and for the H-34 rotor at advance ratios of 0.29 and 0.18. Comparisons of these results with available measured results are presented. (Author)
AD-666 802 HC$3.00 MF$0.65

DESIGN STUDY AND MODEL STRUCTURES TEST PROGRAM TO IMPROVE FUSELAGE CRASHWORTHINESS.
Final rept.,
General Dynamics/Convair San Diego Calif
D. L. Greer, T. L. Heid, and J. D. Weber. Oct 67, 127p
FAA-ADS-67-20
Contract FA-67-WA-1541

Descriptors: (*Transport planes, *Fuselages), (*Commercial planes, Aviation safety), Aviation accidents, Design, Models (Simulations), Aircraft cabins, Structural properties, Impact shock, Digital computers, Computer programs, Panels (Structural), Loading (Mechanics), Airplane panels, Deformation, Bending, Deflection, Impact tests, Model tests.
Identifiers: *Crashworthiness, Skin (Structural).

The study was performed to evaluate methods of improving fuselage cabin integrity during crash impact loadings. The report includes: (1) analytical studies to determine the axial and lateral energy absorbing capability and collapse effects of typical fuselage structure, (2) a test program using representative sections of fuselage structure to substantiate the analytical studies and (3) a digital computer program to obtain fuselage dynamic response in a crash impact. (Author)
AD-666 816 HC$3.00 MF$0.65

ANALYTICAL REVIEW OF MILITARY HELICOPTER FLYING QUALITIES.
Final rept.,
Systems Technology Inc Hawthorne Calif
R. P. Walton, and I. L. Ashkenas. Aug 67, 196p
Rept no. STI-TR-143-1
Contract Now-64-0601

Descriptors: (*Helicopters, Performance (Engineering)), Handling, Specifications, Military requirements, Gust loads, Stability, Equations of motion, Instrument flight, Aerodynamic characteristics, Pilots, Hovering, Reviews, Flight control systems, Servomechanisms, Man-machine systems.
Identifiers: Closed-loop control systems, Open-loop control systems.

The report is directed at analysis and review of the current military helicopter flying qualities specification, MIL-H-8501A, and of the relevant published literature. The analytical approach rests primarily on servo-analysis of closed-loop piloting tasks and secondarily on open-loop response considerations, and such analysis and considerations are used as the basis for correlating and 'explaining' the available data. This process delineates those flying qualities criteria (either in the specification or proposed in the literature) which are valid, and establishes bases for additional experiments in inadequately explored critical areas. The results are specifically applied to an itemized critique of MIL-H-8501A (excluding autoration, miscellaneous, instrument flight, and vibration characteristics). (Author)
AD-666 827 HC$3.00 MF$0.65

SIMULATION AND ANALYSIS OF OVER-OCEAN SEPARATION ASSURANCE PROCEDURES AND DISPLAYS.
Final rept.,
National Aviation Facilities Experimental Center Atlantic City N J
Warren G. Crook, and Richard L. Sulzer. Feb 68, 76p Rept no. NA-68-14
FAA-RD-67-43

Descriptors: (*Air traffic control systems, *Display systems), (*Flight paths, Separation), (*Range finding, Aircraft equipment), Evasion, Air-to-air, Aviation safety, Distance-measuring equipment, Flight testing, Flight simulators, Warning systems, Airborne, Cockpits, Beacons, Time, Frequency.
Identifiers: *Collision avoidance, Over-ocean flight.

After an analysis of operational characteristics in North Atlantic air traffic and the Air Traffic Control system, standard operating procedures (SOP) for pilot use of air-derived separation information were developed and tested in flight simulators. Three individual system types were simulated: Air-to-Air Distance Measuring Equipment (DME), Airborne Beacon Range/Altitude Monitor, and Airborne Time/Frequency Range/Altitude Monitor (T/F). The capabilities and limitations of each system display (in its initial form) and pilot preferences were determined through exercise in a wide diversity of aircraft intrusion situations. Horizontal and vertical evasive maneuvers, as required by the SOP, were employed in all the test runs which included slow and fast-closing, as well as head-on encounters. Altitude probing before a vertical maneuver was tested. With immediate and assured communications, and with the tested SOP, the displays were all adequate to insure separation. Pilot preferences were for the simplest displays and controls. Densities above three conflicting aircraft were not tested nor were reception problems due to multipath or other physical sources of signal error included. (Author)
AD-666 829 HC$3.00 MF$0.65

BITE-SIZE FOOD IN FIGHTER AIRCRAFT.
School of Aerospace Medicine Brooks AFB Tex
For primary bibliographic entry see Field 6H.
AD-666 909 HC$3.00 MF$0.65

EXCEEDANCES OF STRUCTURAL INTERACTION BOUNDARIES FOR RANDOM EXCITATION,
Aeronautical Research Associates of Princeton Inc N J
John C. Houbolt. Dec 67, 14p Rept no. ARAP-113
AFOSR-68-0032
Contract AF 49 (638)-1640

Descriptors: (*Airframes, *Gust loads), Aeroelasticity, Airplanes, Interactions, Vibration, Design.

A general theory is developed for determining the number of times a given structural interaction boundary is exceeded when the structure is under random excitation. One of the practical problems of concern is that of an airplane encountering a random gust field, where spar design is governed by interaction curves involving combined axial and shear stresses. Based on a normal-type joint distribution curve, a fairly simple basic equation is developed which allows for the rapid evaluation of the number of exceedance of any stipulated interaction curve. The similarity of the equation with Rice's familiar equation for the single variable case is shown. The theory and results are also developed for cases which obey non-normal distribution laws of the type that are more likely to be found in practice. In addition, exact solutions are obtained for certain special cases of interest. (Author)
AD-666 942 HC$3.00 MF$0.65

PRESSURE DISTRIBUTION ON A HYPERSONIC DELTA WING OF DIAMOND CROSS-SECTION,
Douglas Aircraft Co Inc Santa Monica Calif Missile and Space Systems Div
A. I. Ormsbee. Jul 67, 13p Rept no. DAC-60715

Descriptors: (*Delta wings, Hypersonic characteristics), Camber, Pressure, Distribution, Geometric forms, Angle of attack, Shock waves, Yaw, Equations of motion.
Identifiers: Cross flow, Pressure distribution.

The work is concerned with the disturbance region associated with a yawed hypersonic delta wing of diamond cross-section. The analysis is presented for zero angle of attack, and it is then shown how angle-of-attack effects may be included. (Author)
AD-667 066 HC$3.00 MF$0.65

CONTINUED RELIABILITY OF TRANSPORT-TYPE AIRCRAFT STRUCTURE.
Federal Aviation Agency Washington D C
1968, 4p
Prepared for presentation at the FAA Maintenance Symposium 'Continued Reliability of Transport Type Aircraft Structure', Washington, D. C. 2-4 Nov 66.

Descriptors: (*Transport planes, Reliability), (*Commercial planes, Symposia), Maintenance, Maintainability, Airframes, Fatigue (Mechanics), Corrosion.

The agenda for the 3-day symposium is presented.
AD-667 139 HC$3.00 MF$0.65

FAA DEVELOPMENTS RELATIVE TO DESIGN OF NEW AIRCRAFT STRUCTURES,
Federal Aviation Agency Washington D C Flight Standards Service
James E. Dougherty. 1966, 11p
Prepared for presentation at the FAA Maintenance Symposium 'Continued Reliability of Transport Type Aircraft Structure', Washington, D. C., 2-4 Nov 66.

Descriptors: (*Transport planes, *Supersonic planes), (*Vertical take-off planes, Design), Commercial planes, Airframes, Aviation safety, Short take-off planes, Reliability, Maintenance, Rotary wings, Helicopters.
Identifiers: Supersonic transport planes, Federal Aviation Regulations, Crashworthiness.

The following broad areas are covered: (1) Supersonic transports; (2) Transport Designs under Federal Aviation Regulation 25; (3) General aviation designs under Federal Aviation Regulation 23; (4) Rotorcraft designs under Federal Aviation Regulations 27 and 29; (5) V/STOL aircraft; (6) Crashworthiness and passenger evacuation.
AD-667 140 HC$3.00 MF$0.65

ANATOMY OF A STRUCTURAL REPAIR,
American Airlines Tulsa Okla Maintenance and Engineering Center
P. C. Johnson. 1968, 4p
Prepared for presentation at the FAA Maintenance Symposium 'Continued Reliability of Transport Type Aircraft Structure', Washington, D. C., 2-4 Nov 66.

Descriptors: (*Commercial planes, Maintenance), Airframes, Structural parts, Cost effectiveness, Reliability, Design, Instruction manuals, Scheduling.

The report discussed the following topics: (1) What can the manufacturer do to minimize the need for repairs; (2) How can the operators minimize the effects of repairs; (3) How can the regulatory agencies assist us to minimize down-time.
AD-667 141 HC$3.00 MF$0.65

STRUCTURAL INSPECTIONS AND TECHNIQUES FOR OLDER TRANSPORT AIRCRAFT,
Delta Air Lines Inc Atlanta Ga
C. B. Wilder. 1968, 24p
Prepared for presentation at the FAA Maintenance Symposium 'Continued Reliability of Transport Type Aircraft Structure,' Washington, D. C., 2-4 Nov 1966.

Descriptors: (*Transport planes, Reliability), Airframes, Maintenance, Commercial planes, Scheduling, Quality control, Visual inspection, X-ray photography, Cracks, Symposia.
Identifiers: *Inspection methods, C-47 aircraft, C-118 aircraft, DC-7 aircraft.

Inspection methods discussed include visual, x-ray, and ultrasonic inspection.
AD-667 142 HC$3.00 MF$0.65

AIRCRAFT STRUCTURE RELIABILITY PROGRAMS,
National Airlines Inc Miami Fla
H. J. Young. 2 Nov 66, 16p
Prepared for presentation at the FAA Maintenance Symposium 'Continued Reliability of Transport Type Aircraft Structure', Washington, D. C., 2-4 Nov 1966.

Descriptors: (*Commercial planes, Reliability), (*Jet transport planes, Reliability), Airframes, Maintenance, Design, Communication systems, Failure (Mechanics), Aviation safety.
Identifiers: C-135 Aircraft.

The development of Aircraft Structure Reliability Programs follows the basic philosophy that aircraft design, aircraft maintenance programs and communications, the three factors controlling Airworthiness and Reliability, have been reconciled by all parties comprising the Aviation Industry. The report discusses each of these three factors. (Author)
AD-667 143 HC$3.00 MF$0.65

FACTORS OF SAFETY AND FAIL SAFE STRENGTH CRITERIA,
Federal Aviation Agency Washington D C Flight Standards Service
William J. McNair. 4 Nov 66, 9p
Prepared for presentation at the FAA Maintenance Symposium 'Continued Reliability of Transport Type Aircraft Structure,' Washington, D. C., 2-4 Nov 1966.

Descriptors: (*Commercial planes, Fatigue (Mechanics)), (*Transport planes, Fatigue (Mechanics)), Civil aviation, Aviation safety, Standards, Mechanical properties, Maintenance, Reliability, Loading (Mechanics), Symposia.
Identifiers: Federal Aviation Regulations, Fail-safe strength.

The paper briefly traces the origin and use of the term 'fatigue' in civil aviation. Sections of the current Federal Aviation Regulations pertaining to factors of safety and fail safe strength criteria for fixed wing transport aircraft are briefly reviewed. Emphasis is also focused on the importance of adequate maintenance inspection intervals and procedures for aircraft. (Author)
AD-667 144 HC$3.00 MF$0.65

FAA PRESENT AND FUTURE PHILOSOPHY IN REGULATING AIRCRAFT STRUCTURAL MAINTENANCE PROGRAMS,
Federal Aviation Agency Washington D C Flight Standards Service
K. E. Neland. 4 Nov 66, 5p
Prepared for presentation at the FAA Maintenance Symposium 'Continued Reliability of Transport Type Aircraft Structure,' Washington, D. C., 2-4 Nov 1966.

Descriptors: (*Commercial planes, Maintenance), (*Transport planes, Maintenance), Supersonic planes, Reviews, Reliability, Gas turbines, Airframes, Management planning, Philosophy, Symposia, Standardization.
Identifiers: Federal Aviation Regulations, Supersonic transport planes.

The Agency and the industry have progressed through three major maintenance concepts in the last 25 years or so. Broadly speaking, Phase I was the era before World War II or the DC-3 era. Phase II was the period immediately following the end of World War II and included the piston-powered Constellation, Conviar, Curtiss, Boeing, and Douglas equipment. Phase III, the present stage, basically covers the turbine-powered airplanes. Phase IV is tomorrow, and while the FAA and the industry must provide for the DC-3's and piston-powered large airplanes, the primary philosophy must be developed so that it provides for the safety of a growing fleet of turbine-powered airplanes, plus the 'jumbo jet' and the supersonic transport (SST). (Author)
AD-667 145 HC$3.00 MF$0.65

STRUCTURAL INSPECTION PLANNING FOR BUSINESS EXECUTIVE AIRCRAFT,
Grumman Aircraft Engineering Corp Bethpage N Y
James E. Brennan. 3 Nov 66, 12p
Prepared for presentation at the FAA Maintenance Symposium 'Continued Reliability of Transport Type Aircraft Structure,' Washington, D. C., 2-4 Nov 1966.

Descriptors: (*Jet transport planes, Maintenance), Airframes, Civil aviation, Reliability, Turbofan engines, Design, Sonic fatigue, Visual inspection, Maintainability, Management planning.
Identifiers: Inspection methods, Gulfstream 2 aircraft, Private planes, Small planes.

A brief review is given of the design and testing concepts used in the development of the turbofan Gulfstream II.
AD-667 146 HC$3.00 MF$0.65

STRUCTURAL INSPECTION PROGRAMS,
Qantas Airways Ltd Sydney (Australia)
Robert H. Stevens. Nov 66, 16p
Prepared for presentation at the FAA Maintenance Symposium 'Continued Reliability of Transport Type Aircraft Structure,' Washington, D. C., 2-4 Nov 1966.

Descriptors: (*Jet transport planes, Maintenance), (*Commercial planes, Maintenance), Airframes, Visual inspection, Reliability, Sampling, Cost effectiveness, Quality control, Australia, Symposia.
Identifiers: *Inspection methods, C-135 aircraft, Boeing 707 aircraft.

The paper discusses structural sampling inspections in inspecting a fleet of Boeing 707 aircraft. At the present time the total Boeing fleet consists of nineteen aircraft, which are again subdivided into thirteen type 707-138B and six type 707-338C aircraft. (Author)
AD-667 147 HC$3.00 MF$0.65

AIRCRAFT STRUCTURE SAMPLING INSPECTION PROGRAMS,
United Air Lines Inc Chicago Ill
C. A. Asvitt, H. F. Heap, and H. L. Storey. 1968, 33p
Prepared for presentation at the FAA Maintenance Symposium 'Continued Reliability of Transport Type Aircraft Structure,' Washington, D. C., 2-4 Nov 1966.

Descriptors: (*Jet transport planes, Maintenance), (*Commercial planes, Maintenance), Airframes, Failure (Mechanics), Reliability, Quality control, Sampling, Visual inspection, Scheduling, Detection, Symposia, Cost effectiveness.
Identifiers: *Inspection methods, DC-8 aircraft, Boeing 727.

A discussion is given of the concept of structural sampling inspection programs, the progressive block sampling technique, and some United Air Lines DC-8 and 727 experience related to the discussion.
AD-667 148 HC$3.00 MF$0.65

STATE OF THE ART IN DESIGN AND TESTING TO ENSURE CONTINUED AIRCRAFT STRUCTURAL INTEGRITY,
Boeing Co Renton Wash Commercial Airplane Div
A. C. Larsen, and R. E. Watson. 1968, 14p
Prepared for presentation at the FAA Maintenance Symposium 'Continued Reliability of Transport Type Aircraft Structure', Washington, D. C., 2-4 Nov 66.

Descriptors: (*Commercial planes, Structural properties), (*Airframes, State-of-the-art reviews), Transport planes, Design, Load distribution, Jet planes, Structural parts, Test methods, Corrosion inhibition, Fatigue (Mechanics), Bonding, Airplane panels, Steel, Aluminum alloys, Titanium alloys, Fractography, Reliability.
Identifiers: Comprehensive Option Stiffness Method Organization System, Computer analysis.

The paper reviews recent advancements in the design and testing of modern commercial jet aircraft structures as viewed by an American manufacturer. Advancements are continually being made in structural criteria, methods of analysis, materials and processes, structural testing, and the use of fleet experience. Each of these areas is discussed and examples are presented to show how these advancements are employed to ensure continued structural integrity of aircraft. (Author)
AD-667 149 HC$3.00 MF$0.65

THE STATE OF THE ART IN DESIGN AND TESTING CONCEPTS TO ENSURE STRUCTURAL INTEGRITY,
British Aircraft Corp (Operating) Ltd Weybridge (England) Weybridge Div
D. James. Nov 66, 13p
Prepared for presentation at FAA Maintenance Symposium 'Continued Reliability of Transport-Type Aircraft Structure,' Washington, D. C., 2-4 Nov 1966.

Descriptors: (*Transport planes, Reliability), (*Commercial planes, Reliability), Maintenance, Maintainability, State-of-the-art reviews, Design, Airframes, Sonic fatigue, Test methods, Symposia, Corrosion, Turbulence, Loading (Mechanics), Vibration, Great Britain, Civil aviation.
Identifiers: Small planes, Private planes.

A presentation of the British Aircraft Corporation approach to the problems of maintaining a high standard of structural integrity is presented. The discussion is restricted to those topics which it is thought will be of interest to those responsible for aircraft maintenance. (Author)
AD-667 150 HC$3.00 MF$0.65

THE EFFECTS OF TIME IN SERVICE ON STRUCTURAL INTEGRITY OF OLDER TRANSPORT AIRCRAFT,
Douglas Aircraft Co Inc Long Beach Calif Aircraft Div
R. H. Luke. 1966, 12p
Prepared for presentation at the FAA Maintenance Symposium 'Continued Reliability of Transport Type Aircraft Structure,' Washington, D. C., 2-4 Nov 1966.

Descriptors: (*Transport planes, Reliability), (*Commercial planes, Reliability), Maintenance, Life expectancy, Airframes, Fatigue (Mechanics), Wear resistance, Time, Damage, Economics, Civil aviation.
Identifiers: Small planes, Private planes.

Although there is a connection between time in service and fatigue effects, it is not a clear-cut, straight-line type of relationship. The effect of flight time on structural integrity is greatly modified by operating conditions, pilot technique, and the quality of maintenance and inspection. Of these factors, maintenance and inspection is probably the most important. Experience shows that fatigue damage does tend to increase with time in service, but proper inspection and maintenance, which become more important as the airplane ages, will find these conditions and correct them before serious damage is created. The actual service life of the airplane is usually determined by an economic factor rather than a wearout factor.
AD-667 151 HC$3.00 MF$0.65

STRUCTURAL INSPECTION PROGRAMS CORPORATION AIRCRAFT,
Atlantic Aviation Corp Wilmington Del Aircraft Maintenance Service
J. M. Taylor. 1968, 9p
Prepared for presentation at the FAA Maintenance Symposium 'Continued Reliability of Transport Type Aircraft Structure,' Washington, D. C., 2-4 Nov 66.

Descriptors: (*Transport planes, Maintenance), (*Commercial planes, Maintenance), Reliability, Airframes, Quality control, Visual inspection, Test equipment, Structural parts, Symposia, Civil aviation.
Identifiers: Private planes, *Inspection methods, Small planes.

A description is given of Atlantic's structural inspection programs for corporate aircraft and of how such inspections are accomplished.
AD-667 152 HC$3.00 MF$0.65

CARE OF AIRFRAME STRUCTURES FOR BUSINESS AND EXECUTIVE AIRCRAFT,
Minnesota Mining and Mfg Co St Paul
Melvin W. Longlet. 1966, 22p
Prepared for presentation at the FAA Maintenance Symposium 'Continued Reliability of Transport Type Aircraft Structure,' Washington, D. C., 2-4 Nov 1966.

Descriptors: (*Transport planes, Maintenance), Civil aviation, Reliability, Airframes, Malfunctions, Spare parts, Visual inspection, Aircraft equipment, Civil aviation.
Identifiers: Private planes, Small planes.

An explanation is given of how the National Business Aircraft Association accomplishes the maintenance of the structural integrity of the aircraft it operates.
AD-667 153 HC$3.00 MF$0.65

LARGE-SCALE WIND-TUNNEL TESTS OF A DEFLECTED SLIPSTREAM STOL MODEL WITH WINGS OF VARIOUS ASPECT RATIOS.
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
W. H. Deckert, S. O. Dickinson, and V. R. Page. Mar 68, 56p NASA-TN-D-4448
Contract 721-01-00-16-00-21

Descriptors: *Aircraft stability, *Propeller slipstreams, *Short takeoff aircraft, *Wind tunnel models, Aerodynamic characteristics, Lift, Longitudinal control, Trailing-edge flaps.

For abstract, see STAR 06 09.
N68-18771 HC$3.00 MF$0.65

RECENT DEVELOPMENTS IN WIND TUNNEL MEASUREMENTS OF AERODYNAMIC DERIVATIVES.
National Aeronautics and Space Administration, Washington, D. C.
For primary bibliographic entry see Field 1A.
For abstract, see STAR 06 09.
N68-18815 HC$3.00 MF$0.65

FLIGHT HANDLING QUALITY PROBLEMS POSED BY SWEPT-WING TRANSPORT PLANES WITHOUT TAIL UNITS.
Quelques Problemes de Qualites de Vol Poses Par les Avions de Transport A Aile Elancee Sans Empennage
National Aeronautics and Space Administration, Washington, D. C.
E. Fage, and P. Lecomte. Jun 66, 60p NASA-TT-F-10204
Conf- Presented At the 28th Meeting of the Flight Mech. Group of Agard

Descriptors: *Aircraft stability, *Controllability, *Flight control, *Swept wings, *Transport aircraft, Aerodynamic characteristics, Aircraft performance, Control surfaces, Lateral stability, Longitudinal stability, Pilot performance.

For abstract, see STAR 06 09.
N68-19018 HC$3.00 MF$0.65

FUNDAMENTALS IN THE THEORY OF A WING PROFILE IN A SUPERSONIC FLOW.
Osnovy Teorii Profilya Kryla V Sverkhzvukovom Potoke
Techtran Corp., Glen Burnie, Md.
N. S. Arzhanikov, and G. S. Sadekova. Mar 68, 29p NASA-TT-F-11456
Contract NASW-1695
Coll- 29 P Tran- Transl. Into English From the Book "aerodinamika Bol'shikh Skorostey" Moscow, Izd. Vysshaya Shkola, 1965 P 176-205

Descriptors: *Flow theory, *Supersonic flow, *Wing profiles, Compressing, Flat plates, Inviscid flow, Lift, Pressure distribution, Rarefaction, Stress-strain diagrams, Subsonic flow, Thin airfoils, Turbulent flow, Viscous flow.

For abstract, see STAR 06 09.
N68-19023 HC$3.00 MF$0.65

THEORY OF A WING WITH FINITE SPAN IN SUPERSONIC FLOW.
Teoriya Kryla Konechnogo Razmakha V Sverkhzvukovom Potoke
Techtran Corp., Glen Burnie, Md.
N. S. Arzhanikov, and G. S. Sadekova. Mar 68, 71p NASA-TT-F-11461
Contract NASW-1695
Coll- 71 P Tran- Transl. Into English From the Book "aerodinamika Bol'shikh Skorostey" Moscow, Izd. Vysshaya Shkola, 1965 P 206-280

Descriptors: *Delta wings, *Flow theory, *Rectangular wings, *Supersonic flow, *Wing span, Aerodynamic characteristics, Wave resistance, Wing tips.

For abstract, see STAR 06 09.
N68-19024 HC$3.00 MF$0.65

WING SURFACE PRESSURE DATA FROM LARGE-SCALE WIND-TUNNEL TESTS OF A PROPELLER-DRIVEN STOL MODEL.
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
V. R. Page, and P. T. Soderman. Mar 68, 65p
NASA-TM-X-1527
Contract 721-01-00-16-00-21

Descriptors: *Pressure distribution, *Short takeoff aircraft, *Tables (data), *Wing span, Leading edge slats, Propeller drive, Thrust, Trailing-edge flaps, Wind tunnel models.

For abstract, see STAR 06 09.
N68-19065 HC$3.00 MF$0.65

ANALOG STUDY OF THE LONGITUDINAL RESPONSE OF A SWEPT-WING TRANSPORT AIRPLANE TO WIND SHEAR AND SUSTAINED GUSTS DURING LANDING APPROACH.
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
For primary bibliographic entry see Field 1B.
For abstract, see STAR 06 09.
N68-19180 HC$3.00 MF$0.65

FLIGHT INVESTIGATION TO DETERMINE THE EFFECT OF LONGITUDINAL CHARACTERISTICS ON LOW-SPEED INSTRUMENT OPERATION.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
D. J. Di Carlo, J. R. Kelly, and R. W. Sommer. Mar 68, 22p NASA-TN-D-4364
Contract 721-06-00-03-23

Descriptors: *Aircraft stability, *Controllability, *Flight tests, *Longitudinal stability, *V/stol aircraft, Aerodynamic characteristics, Aircraft performance, Angle of attack, Attitude control, Flight control, Helicopters, Instrument flight rules, Pilot performance.

For abstract, see STAR 06 09.
N68-19184 HC$3.00 MF$0.65

LARGE-SCALE WIND-TUNNEL TESTS OF AN AIRPLANE MODEL WITH TWO PROPELLERS AND ROTATING CYLINDER FLAPS.
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
For primary bibliographic entry see Field 1A.
For abstract, see STAR 06 09.
N68-19189 HC$3.00 MF$0.65

THE POTENTIALS OF COMPOSITE STRUCTURES IN THE DESIGN OF AIRCRAFT.
Advisory Group for Aerospace Research and Development, Paris (France).
For primary bibliographic entry see Field 11D.
For abstract, see STAR 06 09.
N68-19228 HC$3.00 MF$0.65

EFFECT OF BOATTAIL JUNCTURE SHAPE ON PRESSURE DRAG COEFFICIENTS OF ISOLATED AFTERBODIES.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
For primary bibliographic entry see Field 1A.
For abstract, see STAR 06 09.
N68-19237 HC$3.00 MF$0.65

A METHOD FOR THE SURFACE INSTALLATION AND FAIRING OF STATIC-PRESSURE ORIFICES ON A LARGE SUPERSONIC-CRUISE AIRPLANE.
National Aeronautics and Space Administration. Flight Research Center, Edwards, Calif.
N. V. Taillon. Mar 68, 12p NASA-TM-X-1530
Contract 732-01-00-02-24

Descriptors: *Fairings, *Pressure gages, *Static pressure, *Supersonic aircraft, Aerodynamic characteristics, Aerodynamic drag, Boundary layer flow, Friction factor, Orifices, Skin friction, Streamlining, Wings.

For abstract, see STAR 06 09.
N68-19341 HC$3.00 MF$0.65

MEASUREMENT OF AERODYNAMIC DERIVATIVES IN WIND TUNNELS AND IN FLIGHT. PART 1 - RESEARCH IN WIND TUNNELS. PART 2 - DETERMINATION IN FLIGHT OF THE AERODYNAMIC COEFFICIENTS OF AN AIRCRAFT BY THE STUDY OF ITS FREQUENCY RESPONSE.
National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
For primary bibliographic entry see Field 1A.
For abstract, see STAR 06 09.
N68-19350 HC$3.00 MF$0.65

RAIN EROSION AND ASSOCIATED PHENOMENA.
Federal Ministry for Defence, Bonn (West Germany). Royal Aircraft Establishment, Farnborough (England).
For primary bibliographic entry see Field 11G.
For abstract, see STAR 06 09.
N68-19401 HC$3.00 MF$0.65

AIRCRAFT ACCIDENT REPORT. LAKE CENTRAL AIRLINES, INC. ALLISON PROP-JET CONVAIR 340 N73130, NEAR MARSEILLES, OHIO MARCH 5, 1967.
National Transportation Safety Board, Washington, D. C.
For primary bibliographic entry see Field 1B.
PB-177 339 HC$3.00 MF$0.65

AIRCRAFT ACCIDENT REPORT. AIRLIFT INTERNATIONAL, INC. DOUGLAS DC-7C, N2282 TACHIKAWA AIR BASE, TOKYO, JAPAN SEPTEMBER 12, 1966.
National Transportation Safety Board, Washington, D. C.
For primary bibliographic entry see Field 1B.
PB-177 339-1 HC$3.00 MF$0.65

AIRCRAFT ACCIDENT REPORT, LEXINGTON AIR TAXI, INC. BEECH C-45H, N3727G NEAR BLUE GRASS FIELD LEXINGTON, KENTUCKY, APRIL 3, 1967.
National Transportation Safety Board, Washington, D. C.
For primary bibliographic entry see Field 1B.
PB-177 339-2 HC$3.00 MF$0.65

1D. Aircraft Flight Control and Instrumentation

SERVICE TEST OF LIGHT, GLIDE ANGLE INDICATOR, UNDER ARCTIC WINTER CONDITIONS.
Final rept. 14 Nov 64-1 Mar 65.
Army Arctic Test Center, Fort Greely, Alaska.
25 Apr 65, 37p

Descriptors: (*Flight instruments, Glide path systems), Cold weather tests, Army equipment, Military requirements, Batteries + components, Temperature, Safety, Weight, Polar regions.
Identifiers: Gail (Glide angle indicator).

A service test was conducted on the light, glide angle indicator by the U. S. Army Arctic Test Center at Fort Greely, Alaska, from 14 November 1964 to 1 March 1965. The test indicator met all of the military characteristics with exception of weighing 1 1/2 pounds over the requirement of 25 pounds. No deficiencies were encountered. It is concluded and then recommended that the light, glide angle indicator be considered suitable for Army use under arctic winter conditions and as many shortcomings as possible, be corrected. (Author)
AD-478 336 HC$3.00 MF$0.65

SIMULATION AND ANALYSIS OF OVER-OCEAN SEPARATION ASSURANCE PROCEDURES AND DISPLAYS.
National Aviation Facilities Experimental Center Atlantic City N J
For primary bibliographic entry see Field 1C.
AD-666 829 HC$3.00 MF$0.65

FLIGHT INVESTIGATION TO DETERMINE THE EFFECT OF LONGITUDINAL CHARACTERISTICS ON LOW-SPEED INSTRUMENT OPERATION.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
For primary bibliographic entry see Field 1C.
For abstract, see STAR 06 09.
N68-19184 HC$3.00 MF$0.65

1E. Air Facilities

FOG DISPERSAL OVER AIRPORT RUNWAYS BY A MECHANICAL METHOD.
Nebelbeseitigung Ueber Landebahnen Auf Flugplaetzen Mit Hilfe Eines Mechanischen Entnebelungs-verfahrens
Royal Aircraft Establishment, Farnborough (England).
U. Schmieschek. Oct 67, 17p RAE-LIB-TRANS-1257, DLR-FB-67-23
Tran- Transl. Into English From German Report Dlr-fb-67-23, Mar. 1967

Descriptors: *Dispersing, *Fog, *Sieves, *Visibility, Airports, Filtration, Propeller fans, Runways.

For abstract, see STAR 06 09.
N68-19059 HC$3.00 MF$0.65

2. AGRICULTURE

2A. Agricultural Chemistry

CBE FACTORS: MONTHLY SURVEY NO. 22.
Library of Congress Washington D C Aerospace Technology Div
For primary bibliographic entry see Field 15B.
AD-666 991 HC$3.00 MF$0.65

2B. Agricultural Economics

INFLUENCE OF A MAJOR HIGHWAY IMPROVEMENT ON AN AGRICULTURALLY-BASED ECONOMY: CASE STUDY OF THE IMPACT OF INTERSTATE 94 ON THE ECONOMY OF DUNN AND ST. CROIX COUNTIES, STATE OF WISCONSIN,
Wisconsin Univ., Madison. Bureau of Business Research.
For primary bibliographic entry see Field 13B.
PB-177 155 HC$3.00 MF$0.65

JOURNAL FOR SCIENTIFIC AGRICULTURAL RESEARCH, VOL. 20, NO. 69, 1967.
National Science Foundation, Washington, D. C. Special Foreign Currency Science Information Program.
For primary bibliographic entry see Field 2E.
TT-67-58019/2 HC$3.00 MF$0.65

2C. Agricultural Engineering

A SIMPLE LYSIMETER FOR MEASURING THE LATENT HEAT TRANSFER FROM A VEGETATIVE COVER.

Final rept.,
Missouri Univ., Columbia. Dept. of Soils.
Juanito M. Ramirez, and Wayne L. Decker. 1 Jul 66, 71p
Contract Cwb-WBG-37

Descriptors: (*Evapotranspiration, Measurement), Heat transfer, Temperature, Water, Moisture, Radiation measurement systems, Neutron reactions, Sampling, Theses, Missouri, Plants (Botany).
Identifiers: Lysimeters, Soybeans.

The cycle which transports water vapor from the surface of the earth to the atmosphere and returns it to the surface as precipitation is intricately related to several environmental and biological factors. If a particular vegetative cover is grown on a soil with abundant water, the water loss from the vegetative cover will be a function of the meteorological environment. Many empirical and theoretical relationships have been derived to estimate the evaporation and transpiration from a plant canopy using meteorological variables. Since the appraisal of these formulas requires field measurements, this study of the water use by a soybean canopy was instigated. (Author)
PB-177 739 HC$3.00 MF$0.65

CLIMATOLOGICAL STUDIES.
Iowa State Univ. of Science and Technology, Ames. Dept. of Agronomy.
For primary bibliographic entry see Field 8M.
PB-177 745 HC$3.00 MF$0.65

2D. Agronomy and Horticulture

JOURNAL FOR SCIENTIFIC AGRICULTURAL RESEARCH, VOL. 20, NO. 69, 1967.
National Science Foundation, Washington, D. C. Special Foreign Currency Science Information Program.
For primary bibliographic entry see Field 2E.
TT-67-58019/2 HC$3.00 MF$0.65

2E. Animal Husbandry

JOURNAL FOR SCIENTIFIC AGRICULTURAL RESEARCH, VOL. 20, NO. 69, 1967.
National Science Foundation, Washington, D. C. Special Foreign Currency Science Information Program.
1967. 132p SFCSI-Agr (TT-67-58019/2)
Trans. of Arhiv za Poljoprivredne Nauke i Tehniku (Yugoslavia) v20 n69 p3-162 1967, tr. by Bozidar Filipovic, Mihailo Markovic, Lazar Stanojevic, and Branislav Romcevic.

Descriptors: (*Agriculture, Yugoslavia), Weather, Corn, Fruits, Vegetables, Molybdenum, Plants (Botany), Nutrition, Photosynthesis, Soil, Erosion, Pigs, Sheep.

Contents: Single crop and weather conditions in corn growing; Regenerative ability of frost-damaged peach trees; A new variety of strawberry; Effect of molybdenum on alfala development and symbiotic nitrogen fixation; Phases of development of some important soybean varieties; Assimilation of carbon into some organic matters in young corn plants grown under various conditions of nutrition; Contribution to the study of photosynthesis productivity of some high yield types of wheat in field conditions; Erosion and measures for the protection of soil on red sandstones in East Serbia; Acclimatization of large white pigs to conditions of North Banat; The reproductive performance of the improved Dutch large pig (Dutch Landrace) in Yugoslav conditions; Meat production of the first cross progeny of pirot sheep and merino-arles rams; Production of oestrus and insemination of ewes during lactation for the purpose of improving their reproductive performance; The effect of crossing Svrljig ewes and Corridall rams on important characteristics of the reproductive performance of the crosses produced.
TT-67-58019/2 HC$3.00 MF$0.65

2F. Forestry

VEGETATION ANALYSIS WITH RADAR IMAGERY.
Kansas Univ., Lawrence. Engineering Science Div.
S. A. Morain, and D. S. Simonett. 1966, 21p
NASA-CR-75170, CRES-61-9
Contract NSR-17-004-003
Conf- Presented At the 4th Symp. on Remote Sensing of the Environ., Ann Arbor, Mich., 11-14 Apr. 1966

Descriptors: *Aerial photography, *Photoreconnaissance, *Radar photography, *Terrain analysis, Geography, Radar data, Topography, Vegetation.

For abstract, see STAR 06 09.
N68-19214 HC$3.00 MF$0.65

DEER BROWSE RESOURCES OF THE ATOMIC ENERGY COMMISSION'S SAVANNAH RIVER PROJECT AREA.
Forest Service Resource bull.,
Southeastern Forest Experiment Station, Asheville, N. C.
William H. Moore. Dec 67, 29p FSRB-SE-6

Descriptors: (*Natural resources, Statistical analysis), Mammals, Food, Consumption, Production, Survival, Statistical data, Starvation, Acceptability, Plants (Botany), Forestry.
Identifiers: *Deer pasture, Savannah River Project Area.

A procedure developed in Georgia was used to inventory the browse resources of the Atomic Energy Commission's Savannah River Project Area near Aiken, South Carolina. Through this procedure, the forest land manager is supplied with relative carrying capacity data for deer. If silvical practices can be related to habitat quality and quantity, he can adjust management procedures to improve wildlife habitat as well as timber. (Author)
PB-177 685 HC$3.00 MF$0.65

3. ASTRONOMY AND ASTROPHYSICS

3A. Astronomy

DETERMINATION OF THE GRAVITATIONAL FIELD OF THE MOON BY THE MOVEMENT OF THE ARTIFICIAL MOON SATELLITE LUNA-10,
Foreign Technology Div Wright-Patterson AFB Ohio
E. L. Akim. 9 Aug 67, 13p Rept no. FTD-HT-67-50
Unedited rough draft trans. of Akademiya Nauk SSSR. Doklady, v170 n4 p799-802 1966, tr. by E. Harter.

Descriptors: (*Moon, Gravity), (*Lunar satellites, USSR), Lunar trajectories, Motion, Statistical processes, Mathematical analysis, Measurement, Oscillation, Perigee, Apogee.
Identifiers: Translations, Luna-10 Satellites.

To determine the noncentral gravitational field of the Moon, the motion of the artificial Moon satellite 'Luna 10' is analyzed with gravitational forces of the Earth and the Sun taken into account. From the statistically processed measurements of the trajectory of Luna-10 carried out over the period of its existence (from April 3 to May 30, 1966), it is established that the effect of noncentrality of the gravitational field of the Moon is an essential factor in the evolution of the orbit of Luna-10. The perturbations of its circumlunar orbit due to noncentrality of the gravitational field of the Moon are particularly noticeable in the evolution of the longitude of the ascending node and the angular distance of the pericenter to the ascending node. The perturbations of elements and of Luna-10 during the time of its existence (460 revolutions) due to noncentrality of the gravitational field of the Moon and due to gravitational effects of the Earth and the Sun (the gravitational effects of other planets are neglected) are presented as functions of the number of revolutions of the Moon satellite. A comparison of the results shows that perturbations for Luna-10 due to noncentrality of the gravitational field of the Moon exceed the perturbations due to gravitational forces of the Earth and the Sun 5 to 6 times. (Author)
AD-666 737 HC$3.00 MF$0.65

NON-UNIFORMITY IN THE ROTATION OF THE EARTH ACCORDING TO THE DATA OF ASTRONOMIC OBSERVATIONS FOR THE PERIOD OF 1955.5-1965.0.
Technical translation,
Aeronautical Chart and Information Center St Louis Mo Linguistic Section
N. S. Sidorenkov. Jan 68, 23p
ACIC-TC-1319
Trans. of Astronomicheskii Zhurnal (USSR) v44 n3 p650-62 1967, tr. by Walter L. Burton.

Descriptors: (*Astronomy, USSR), Rotation, Earth (Planet), Time, Velocity, Time-interval counters, Standards, Mathematical analysis.
Identifiers: Translations, Atomic time.

The paper is a discussion of the following phases of the study of the non-uniformity in the rotation of the earth according to the data of astronomic observations: (1) Determining the changes in the velocity of the earth's rotation. These changes may be detected only by way of comparing the scale of the Universal Time (TU), which is determined by the earth's rotation, with any other more regular time scale. (2) Determination of the scale of atomic time. The scale of atomic time (TA) is based on the mean atomic standard which is obtained by way of averaging the readings (integrated frequencies) of the atomic standards of the world's specific laboratories. (3) Determination of the scale for the International Time. The scales of International Time (TI) are deduced from the astronomical determination of time, which are carried out at a number of special observatories, the Time services. (Author)
AD-667 076 HC$3.00 MF$0.65

SOME SPECTRAL-ANALYTICAL PROBLEMS IN ASTRONOMY,
National Research Council of Canada Ottawa (Ontario)
G. Herzberg. 1968, 18p Rept no. NRC-9683
Availability: Published in Colloquium Spectroscopicum Internationale (13th) 18p n.d.

Descriptors: (*Spectroscopy, Symposia), (*Astronomy, Spectroscopy), Comets, Venus (Planet), Mercury (Planet), Spectra (Infrared), Atmosphere, Band spectrum, Mars (Planet), Jupiter (Planet), Saturn (Planet), Uranus (Planet), Neptune (Planet), Earth (Planet), Absorption, Emissivity.

The field of spectroscopy encompasses two rather different domains. Much of the use of spectroscopy in astronomy belongs to the first domain, that is, to spectral analysis. In fact soon after Kirchhoff and Bunsen discovered that each element has a characteristic spectrum of its own, they applied this knowledge to the spectra of the sun and stars and established the presence of some of the same chemical elements present on the earth. Since that time, the presence of many more chemical elements in the sun and the stars has been established by their spectra, and relative concentrations of the elements have been fairly well determined. The study contains analytical problems that deal with the identification of molecules in astronomical sources by means of their spectra. (Author)
AD-667 086 Not available from CFSTI.

NUMBER DENSITY OF MARTIAN CRATERS.
Bellcomm, Inc., Washington, D. C.
For primary bibliographic entry see Field 22A.
For abstract, see STAR 06 09.
N68-18381 HC$3.00 MF$0.65

Group 3A — Astronomy

SPECTROSCOPIC OBSERVATIONS OF MARS FINAL REPORT, 1 NOV. 1966 - 31 JAN. 1968.
IIT Research Inst., Chicago, Ill.
T. C. Owen. 27 Feb 68, 21p NASA-CR-93481
Contract NASR-65/19/

Descriptors: *Absorption spectra, *Astronomical spectroscopy, *Carbon dioxide, *Mars atmosphere, Astronomical observatories, Atmospheric pressure, Line spectra, Moisture content, Spectral bands, Water vapor.

For abstract, see STAR 06 09.
N68-18653 HC$3.00 MF$0.65

A NOTE ON THE RATE OF IMAGE ROTATION APPARENT TO AIRBORNE OBSERVERS.
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
S. M. Smith. 1965, 14p NASA-TM-X-57246
Subm- Submitted for Publication

Descriptors: *Images, *Rotation, *Trigonometric functions, Celestial sphere, Formulas (mathematics), Satellite observation, Visual observation.

For abstract, see STAR 06 09.
N68-18958 HC$3.00 MF$0.65

TEMPERATURE IN THE UPPER ATMOSPHERE OF VENUS AS INDICATED BY THE INFRARED CO2 BANDS.
National Aeronautics and Space Administration. Electronics Research Center, Cambridge, Mass.
P. L. Hanst. 1963, 26p NASA-TM-X-57346
Conf- Presented At the Opt. Soc. of Am., Mar. 1966

Descriptors: *Absorption spectra, *Infrared spectra, *Temperature profiles, *Upper atmosphere, *Venus atmosphere, Atmospheric moisture, Atmospheric temperature, Carbon dioxide, Cloud cover, Emissivity, Venus (planet), Vertical distribution.

For abstract, see STAR 06 09.
N68-19199 HC$3.00 MF$0.65

THE EARLY A STARS 2 - MODEL ATMOSPHERE ABUNDANCE ANALYSIS OF EIGHT STARS IN THE PLEIADES.
Smithsonian Astrophysical Observatory, Cambridge, Mass.
P. S. Conti, and S. E. Strom. Aug 67, 20p NASA-CR-93687, REPT.-706-39
Contracts NGR-22-024-001, AF 49/638/-1323

Descriptors: *Astronomical spectroscopy, *Line spectra, *Stellar atmospheres, Astrophysics, Barium, Calcium, Carbon, Scandium, Star clusters, Stellar spectrophotometry, Strontium, Ytterbium, Zirconium.

For abstract, see STAR 06 09.
N68-19344 HC$3.00 MF$0.65

EFFECT OF EARTH OCCULTATION ON ASTRONOMICAL OBSERVATIONS FROM EARTH ORBIT.
Bellcomm, Inc., Washington, D. C.
D. B. Wood. 15 Feb 68, 16p NASA-CR-93474
Contract NASW-417

Descriptors: *Artificial satellites, *Astronomical observatories, *Occultation, *Satellite orbits, Altitude, Attitude (inclination), Satellite observation.

For abstract, see STAR 06 09.
N68-19353 HC$3.00 MF$0.65

3B. Astrophysics

A SPATIO-TEMPORAL ANALYSIS OF VELOCITY FIELDS IN THE SOLAR PHOTOSPHERE.
Technical rept.,
California Univ Berkeley Space Sciences Lab
Edward N. Frazier. 24 Jan 68, 31p Rept no. Series-9-Issue-6
Contract Nonr-3656 (26), Grant NsG-243
Submitted for publication in Z. Astrophys.

Descriptors: (*Sun, *Solar spectrum), Solar atmosphere, Absorption, Doppler effect, Velocity, Oscillation, Fourier analysis, Gravity, Mechanical waves, Granules, Hydrodynamics, Digital computers.
Identifiers: Graphs (Charts).

A series of high (spatial) resolution spectrograms were taken of the center of the solar disk at Kitt Peak National Observatory, U.S.A. The spectrograms were taken every 20 seconds for 55 minutes. The Doppler shifts of the absorption lines, as well as the intensity fluctuations, both in the continuum and in the lines, were subjected to a simultaneous spatial and temporal Fourier analysis. The results are displayed in the form of contour lines k - omega plane, or diagnostic diagram. These results clearly show convective overshoot at all levels of the photosphere. They also show that the well known 5 minute oscillations are primarily standing resonant acoustic waves. The 'gravity wave' mode was not observed. Arguments are presented suggesting that the oscillations are not formed directly from the 'piston action' of a convective cell impinging on the stable photosphere, but rather are formed within the convection zone itself. (Author)
AD-666 621 HC$3.00 MF$0.65

BIBLIOGRAPHY OF AFCRL PUBLICATIONS FROM 1 JULY 1966 TO 30 SEPTEMBER 1967.
Air Force Cambridge Research Labs L G Hanscom Field Mass
For primary bibliographic entry see Field 5B.
AD-666 664 HC$3.00 MF$0.65

GENERAL RESEARCH.
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 5B.
AD-666 712 HC$3.00 MF$0.65

THE ENERGY DISTRIBUTION IN NOVA HERCULIS 1963.
Final technical rept.,
Washburn Observatory Madison Wis
Robert C. Bless, and Theodore E. Houck. 22 Mar 68, 3p
Grant Nonr (G)-00007-65

Descriptors: (*Novae, Energy), Spectra (Visible + ultraviolet), Spectra (Infrared), Line spectrum.
Identifiers: Nova Herculis 1963, Computer analysis.

Measurements of approximately 9000 spectral features of Nova Herculis 1963 obtained on 44 nights between February 22 and October 13, 1963 and covering the wavelength region from 3200A to 11,500A have been reduced to absolute energy units and are available for analysis. Similar reductions have been made for 2000 features of Nova Herculis 1960 between March 11 and May 13, 1960 in the region 3200A to 6600A. (Author)
AD-666 835 HC$3.00 MF$0.65

THE 11-YEAR SOLAR MODULATION OF COSMIC RAYS AS DEDUCED FROM NEUTRON MONITOR VARIATIONS AND DIRECT MEASUREMENTS AT LOW ENERGIES,
New Hampshire Univ Durham Dept of Physics
For primary bibliographic entry see Field 4A.
AD-666 892 Not available from CFSTI.

SOLAR EVENT FORECAST AIDS.
Final rept. May 65-Nov 67,
Travelers Research Center Inc Hartford Conn
Isadore Enger. Mar 68, 31p Rept no. TRC-7668-297
AFCRL-68-0024
Contract AF 19 (628)-5129

Descriptors: (*Solar disturbances, Mathematical prediction), Extraterrestrial radio waves, Solar flares, Sunspots, Statistical analysis, Numerical analysis, Canada.

The study describes the development of objective aids for predicting daily values of 10.7 cm flux measured at Ottawa. The step-wise regression technique was applied to 18 years of data to develop regression equations expressing flux 1, 2, 3, and 4 days ahead as functions of the past history of flux. The equations were used to compute frequency distributions of the forecast errors to be expected when the equations are applied under real-time conditions. Similar regression equations were also obtained for predicting flux 5, 6, 7, ... 30 days ahead but no error distributions were computed. An attempt was made to improve the one-to four-day forecasts by including in the regression equations the recent history of Zurich sunspot numbers. The results were negative; flux alone did as well as flux and sunspots together. Two reports concerned with objective techniques for predicting the occurrence of solar flares were prepared previously under this contract. Abstracts of both are presented herein. Both the flare and flux techniques are being used routinely as forecast aids by the Solar Forecast Facility of the Air Weather Service. (Author)
AD-666 948 HC$3.00 MF$0.65

A MODEL OF THE SUNSPOT UMBRA,
California Inst of Tech Pasadena
S. M. Chitre, and G. Shaviv. 22 Mar 67, 12p
Contract Nonr-220 (47), Grant NSF-GP-5391
Availability: Published in Solar Physics, v2 p150-7 1967.

Descriptors: (*Sunspots, Mathematical models), Magnetic fields, Convection (Heat transfer), Isotope availability, Temperature.
Identifiers: Solar photosphere.

Equations governing the structure of the umbra of a single spot have been integrated on the spot-axis. It is shown that a consistent umbral model can be obtained only for a narrow range of the electron pressures at the spot surface. The spot center is found to be at a depth of about 400 km below the normal solar surface. The reduced energy flux observed at the surface is assumed to be due to the effect of the spot-magnetic field on subphotospheric convection and an empirical factor beta is introduced to take into account the reduction in the convective energy flux. With an inferred expression for beta as a function of the internal and magnetic-energy density it is shown that in a consistent model the physical variables in the spot approach their ambient values at about 2330 km below the undisturbed solar surface and at the same depth the energy flux approaches the normal solar value and the magnetic interference with convection vanishes. The present investigation is a refinement of an earlier paper by CHITRE (1963). (Author)
AD-667 073 Not available from CFSTI.

NUCLEOSYNTHESIS IN BIG AND LITTLE BANGS,
California Inst of Tech Pasadena
William A. Fowler. 1967, 24p
Contract Nonr-220 (47), Grant NSF-GP-5391
Availability: Published in High Energy Physics and Nuclear Structure, p203-25 1967.

Descriptors: (*Stars, Nuclear reactions), Interstellar matter, Galaxies, Supernovae, Isotope availability, Sun, Blackbody radiation, Hydrogen, Helium, Metals, Nuclear particles.
Identifiers: Nucleosynthesis, Big-bang theory, Stellar evolution, Evolution (Cosmology).

Contents: The site of nucleosynthesis; Abundances in the oldest stars; Universal synthesis in the big bang; The behavior of expanding matter and radiation; The nuclear reactions; Neutrino or antineutrino degeneracy; Supermassive stars.
AD-667 080 Not available from CFSTI.

NON-RADIAL PULSATION OF GENERAL-RELATIVISTIC STELLAR MODELS. I. ANALYTIC ANALYSIS FOR I GREATER OR = 2,
California Inst of Tech Pasadena
Kip S. Thorne, and Alfonso Campolattaro. Sep 67, 22p
Contract Nonr-220 (47), Grant NSF-GP-5391
Prepared in cooperation with California Univ., Irvine.
Availability: Published in The Astrophysical Journal, v149 p591-611 Sep 1967.

Descriptors: (*Stars, Mathematical models), Relativity theory, Perturbation theory, Periodic variations, Kinetic energy, Potential energy, Functions, Equations of motion, Field theory.
Identifiers: Gravitational radiation, Neutron stars.

The theory of small, adiabatic, non-radial perturbations of a star away from hydrostatic equilibrium is developed within the framework of general relativity. The unperturbed equilibrium configuration is an arbitrary, non-rotating, general-relativistic stellar model. The departures from equilibrium are analyzed into tensorial spherical harmonics and then into complex normal modes with various mixtures of incoming and outgoing gravitational waves. A discussion is given of the expansion of real, physical pulsations with purely outgoing gravitational radiation in terms of the complex normal modes. Criteria are developed for stability against non-radial pulsations; and methods are devised for computing numerically the pulsation frequencies, eigenfunctions, and gravitational-radiation damping times of the stable, real quasi-normal modes of pulsation. (Author)
AD-667 081 Not available from CFSTI.

SOLAR NEUTRINOS,
California Inst of Tech Pasadena
John N. Bahcall. 1967, 25p
Contract Nonr-220 (47), Grant NSF-GP-5391
Availability: Published in High Energy Physics and Nuclear Structure, 25p 1967.

Descriptors: (*Stars, Nuclear reactions), (*Neutrinos, Sun), Proton reactions, Nuclear cross sections, Models (Simulations), Mathematical prediction, Relativity theory, Chlorine, Argon, Radiation measurement systems.
Identifiers: Stellar evolution.

Contents: The proton-proton chain; Neutrino fluxes from the sun; The 37Cl experiment; Other experiments; Why observe solar neutrinos.
AD-667 082 Not available from CFSTI.

CRITIQUE OF THE 'CLARK EFFECT,'
California Inst of Tech Pasadena
Robert V. Wagoner. 1967, 4p
Prepared in cooperation with Cambridge Univ. (England). Inst. of Theoretical Astronomy. Supported in part by National Science Foundation, and the Office of Naval Research.
Availability: Published in Nature, v215 n5104 p943-4 Aug 26 1967.

Descriptors: (*Galaxies, Magnetic fields), (*Interstellar matter, Hydrogen), Atomic energy levels, Excitation, Refractive index, Scattering, Magnetooptic effect, Phase shift, Resonant frequency.
Identifiers: *Clark effect, Evolution (Cosmology), Anomalous dispersion.

A direct measurement of the magnetic field strengths within the Galaxy would be of the greatest importance for understanding its structure and evolution, and Clark has proposed a method based on the effect of a magnetic field on the anomalous dispersion of 21 cm radiation passing through neutral hydrogen. This report points out that Clark's calculation contains a fundamental error, rendering the method much less effective than he claims. (Author)
AD-667 083 Not available from CFSTI.

FRIEDMANN COSMOLOGICAL MODEL WITH BOTH RADIATION AND MATTER,
California Inst of Tech Pasadena
Kenneth C. Jacobs. 1967, 4p
Supported in part by the National Science Foundation, and the Office of Naval Research.
Availability: Published in Nature, v215 n5106 p1156-7 Sep 9 1967.

Descriptors: (*Astrophysics, Models (Simulations)), (*Interstellar matter, Blackbody radiation), Field theory, Mathematical analysis.
Identifiers: Evolution (Cosmology), Nucleosynthesis.

The communication presents a new analytical solution to the cosmological model containing both radiation and matter.
AD-667 084 Not available from CFSTI.

SOME SPECTRAL-ANALYTICAL PROBLEMS IN ASTRONOMY,
National Research Council of Canada Ottawa (Ontario)
For primary bibliographic entry see Field 3A.
AD-667 086 Not available from CFSTI.

POLARIZATION PROPERTIES OF A SIMPLE DIELECTRIC ROUGH-SURFACE MODEL,
Grumman Aircraft Engineering Corp Bethpage N Y Research Dept
For primary bibliographic entry see Field 20F.
AD-667 158 Not available from CFSTI.

ON THE ORIGIN OF THE SOLAR SYSTEM.
California Univ., Berkeley. Space Sciences Lab.
H. Alfven. Nov 67, 70p NASA-CR-93420
Grant NSG-243, Contract NGR-05-003-230
Conf- Presented At the Space Sci. Lab. Colloq., Berkeley, Calif., Nov. 1967 Seri- Its Ser. No. 8, Issue No. 105

Descriptors: *Cosmology, *Planetary evolution, *Saturn (planet), *Solar system, Celestial mechanics, Magnetic fields, Magnetosphere; Orbital elements, Ring structures.

For abstract, see STAR 06 09.
N68-18461 HC$3.00 MF$0.65

THE INTERPLANETARY MAGNETIC FIELD, SOLAR ORIGIN AND TERRESTRIAL EFFECTS.
California Univ., Berkeley. Space Sciences Lab.
J. M. Wilcox. 8 Jan 68, 139p NASA-CR-93369, AD-664509
Grant NSG-243, Contract NGR-05-003-230
Seri- Its Ser. No. 9, Issue No. 2

Descriptors: *Geomagnetism, *Interplanetary magnetic fields, *Solar magnetic field, Bibliographies, Diurnal variations, Magnetosphere, Radiation belts, Satellite observation, Solar cosmic rays, Solar protons, Solar storms, Solar wind.

For abstract, see STAR 06 09.
N68-18552 HC$3.00 MF$0.65

RELATIVISTIC SPHERES AS MODELS OF NEUTRON STARS.
Nuclear Energy Information Center, Warsaw (Poland).
B. Kuchowicz. 1967, 29p NEIC-RR-28

Descriptors: *Mathematical models, *Neutron stars, *Relativistic theory, Astrophysics, Einstein equations, Numerical analysis.

For abstract, see STAR 06 09.
N68-18816 HC$3.00

A COLLECTION OF PAPERS RELATED TO PLANETARY METEOROLOGY.
National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
D. K. Weidner. 11 Jan 68, 180p NASA-TM-X-53693

Descriptors: *Atmospheric models, *Mars probes, *Mercury (planet), *Planetary atmospheres, Atmospheric circulation, Atmospheric composition, Atmospheric density, Atmospheric temperature, Computer programs, Computerized simulation, Mars surface, Pressure distribution, Temperature profiles.

For abstract, see STAR 06 09.
N68-18836 HC$3.00 MF$0.65

EARTH-BASED LUNAR ATMOSPHERE INVESTIGATION FINAL REPORT.
Gca Technology Div., Gca Corp., Bedford, Mass.
A. Engelman, E. Manring, F. F. Marmo, and H. A. Miranda, Jr., Aug 67, 119p NASA-CR-65993, GCA-TR-67-15-N
Contract NAS9-5589

Descriptors: *Lunar atmospheres, *Lunar observatories, *Spectrum analysis, Bibliographies, Calcium isotopes, Ebert spectrometers, Radiation spectra, Sodium isotopes, Solar radiation, Spectral emission.

For abstract, see STAR 06 09.
N68-18869 HC$3.00 MF$0.65

RADIATIVE TERMS IN THE THERMAL CONDUCTION EQUATION.
National Aeronautics and Space Administration. Goddard Inst. for Space Studies, New York.
R. W. Stewart. 1967, 26p NASA-TM-X-60925

Descriptors: *Applications of mathematics, *Infrared spectra, *Mars atmosphere, *Thermodynamics, Absorption spectra, Approximation, Atmospheric models, Black body radiation, Carbon monoxide, Emissivity, Infrared radiation, Mathematical models, Oxygen, Radiative heat transfer, Thermodynamic properties.

For abstract, see STAR 06 09.
N68-19006 HC$3.00 MF$0.65

DESIGN AND CALIBRATION OF LOW FREQUENCY RADIO ASTRONOMY SPACE PROBES.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
For primary bibliographic entry see Field 9F.
For abstract, see STAR 06 09.
N68-19081 HC$3.00 MF$0.65

SUBSOLAR-MERIDIAN MEAN ANNUAL DISTRIBUTIONS FOR MARTIAN TROPOSPHERE BELOW 50 KILOMETERS.
St. Louis Univ., Mo.
F. C. Bates. Mar 68, 51p NASA-CR-1043
Contract NGR-26-006-016
Coll- 51 P Refs

Descriptors: *Atmospheric physics, *Mars atmosphere, *Planetary temperature, Bibliographies, Computer programs, Mariner 4 space probe, Spectrophotography, Spectrum analysis, Tables (data).

For abstract, see STAR 06 09.
N68-19192 HC$3.00 MF$0.65

ON THE VARIATION OF THE MICROTURBULENCE PARAMETER WITH CHEMICAL COMPOSITION.

Smithsonian Astrophysical Observatory, Cambridge, Mass.
S. E. Strom. Jan 68, 6p NASA-CR-93686
Contract NGR-22-024-001

Descriptors: *Astronomical spectroscopy, *Dwarf stars, *Stellar atmospheres, Astrophysics, Atmospheric models, Correlation coefficients, Hydrogen, Iron, Line spectra, Turbulence, Velocity distribution.

For abstract, see STAR 06 09.
N68-19348 HC$3.00 MF$0.65

INVESTIGATION OF LUNAR SOIL MODIFICATION DUE TO BOMBARDMENT BY SIMULATED SOLAR PLASMA WIND FINAL REPORT, APR. 1966 - MAR. 1967.
Physics Technology Labs., Inc., La Mesa, Calif.
Mar 67, 174p NASA-CR-93535, A-0045
Contract NAS9-5923

Descriptors: *Lunar soil, *Olivine, *Solar wind, Crystal lattices, Environment simulation, Ion beams, Irradiation, Lattice parameters, Metallography, Radiation effects, Solar flux, Solar radiation.

For abstract, see STAR 06 09.
N68-19381 HC$3.00 MF$0.65

SOLAR WIND SPECTROMETER PROJECT FINAL REPORT, APR. 1966 - JAN. 1968.
Electro-optical Systems, Inc., Pasadena, Calif. Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
For primary bibliographic entry see Field 14B.
For abstract, see STAR 06 09.
N68-19385 HC$3.00 MF$0.65

X-RADIATION OF THE MOON AND ROENTGEN COSMIC BACKGROUND ACCORDING TO DATA OF AMS " LUNA-12".
Rentgenovskoye Izlucheniye Luny I Rentgenovskiy Kosmicheskiy Fon Po Dannym Sputnika Luny "luna-12"
Volt Technical Corp., Washington, D. C.
G. S. Cheremukhin, A. B. Dmitriyev, S. L. Mandelshtam, L. S. Sorokin, and I. P. Tindo. 25 Mar 68, 11p NASA-CR-93658, ST-LPS-RAD-10689
Contract NAS5-12487
Tran- Transl. Into English From Kosmich. Issled. (Moscow), V. 6, No. 1, 1968 P 119-127

Descriptors: *Artificial satellites, *Cosmic rays, *Lunik lunar probes, *Satellite observation, *X ray astronomy, Corpuscular radiation, Electromagnetic radiation, Lunar environment, Radiation counters, Surface properties.

For abstract, see STAR 06 09.
N68-19397 HC$3.00 MF$0.65

SURFACE-GRAVITY DETERMINATIONS FOR MAIN-SEQUENCE B STARS.
Smithsonian Astrophysical Observatory, Cambridge, Mass.
D. M. Peterson, and S. E. Strom. Aug 67, 22p
NASA-CR-93691
Contract NGR-22-024-001

Descriptors: *Astronomical models, *B stars, *Hydrogen, *Line spectra, *Spectral line width, Gravitation, Numerical analysis, Spectral energy distribution, Spectral theory, Stellar structure, Surface waves.

For abstract, see STAR 06 09.
N68-19398 HC$3.00 MF$0.65

COMPOSITION OF THE LUNAR HIGHLANDS - POSSIBLE IMPLICATIONS FOR EVOLUTION OF THE EARTH'S CRUST.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
For primary bibliographic entry see Field 8G.
For abstract, see STAR 06 09.
N68-19437 HC$3.00 MF$0.65

TABLE OF OUTSTANDING SOLAR-TERRESTRIAL EVENTS IN 1954 THROUGH 1967.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
Y. Hakura. Feb 68, 7p NASA-TM-X-63120, X-641-68-62

Descriptors: *Magnetic storms, *Polar cap absorption, *Solar flares, *Type 4 bursts, Tables (data).

For abstract, see STAR 06 09.
N68-19450 HC$3.00 MF$0.65

OBSERVATIONS AND INTERPRETATION OF ULTRAVIOLET EMISSION FROM THE GALAXY.
Nablyudeniya I Interpretatsiya Ultrafioletovogo Izlucheniya Galaktiki
Volt Technical Corp., Washington, D. C.
V. G. Kurt, and R. A. Syunyayev. 20 Mar 68, 8p
NASA-CR-93659, ST-IGA-10690
Contract NAS5-12487
Tran- Transl. Into English From Astron. Zh. (USSR), V. 44, No. 6, 1967 P 1157-1161

Descriptors: *Artificial satellites, *Astronomical spectroscopy, *Galactic radiation, *Ultraviolet radiation, Astrophysics, Cosmic rays, Lyman alpha radiation, Optical measuring instruments, Stellar luminosity.

For abstract, see STAR 06 09.
N68-19453 HC$3.00 MF$0.65

AN INTEGRATING PYRANOMETER FOR CLIMATOLOGICAL OBSERVER STATIONS AND MESOSCALE NETWORKS.
Progress rept. for 30 Sep 67,
Wisconsin Univ., Madison. Dept. of Soil Science.
C. B. Tanner, J. P. Kerr, G. W. Thurtell, and H. Rosendal. 1967, 157p
Grant Cwb-WBG-49

Descriptors: (*Solar radiation, Measurement), Solar cells, Weather stations, Silicon, Networks, Sensors, Distribution, Meters, Performance (Engineering), Sampling, Maps, Climatology, Rayleigh scattering, Wisconsin.
Identifiers: Pyranometers.

The purpose of the study was to obtain information on the space and time variability of global radiation in Wisconsin. Estimates can be made from these data as to the distribution of sampling points required to get a reliable estimate of radiation received at any given place in the state. A secondary objective was to gather information on the performance of the integrating pyranometer under field conditions. (Author)
PB-177 740 HC$3.00 MF$0.65

3C. Celestial Mechanics

INVESTIGATION OF THE LIGHT SCATTERING TECHNIQUE FOR COUNTING AND SIZE DETERMINATION OF MICRON-SIZED METEORITES.
Final rept. 24 Sep 63-31 Jul 67,
Northeastern Univ Boston Mass
John F. Dunn, Jr., Arthur R. Foster, Theodore J. Morin, Jr., Louis J. Nardone, and John L. Swanson. 15 Oct 67, 35p
AFCRL-67-0620
Contract AF 19 (628)-2423

Descriptors: (*Meteors, *Velocity), (*Light transmission, *Scattering), Intensity, Weight, Particle size, Measurement, Counting methods, Pulse height analyzers, Design, Mathematical analysis, Upper atmosphere, Spacecraft, Surface area, Damage.
Identifiers: Meteorites.

The essential characteristics and basic configuration of a compact instrument intended to count and determine the size of micrometeorites by measuring the intensity of light scattered by such micron-sized particles are described. The problems associated with measurement of scattered light intensities in the forward lobe are discussed. (Author)
AD-666 703 HC$3.00 MF$0.65

RECOMBINATION COEFFICIENT AND CORONAL CONTRIBUTION TO E-LAYER IONIZATION FROM MAGNETIC OBSERVATIONS OF A SOLAR ECLIPSE,
Army Electronics Command Fort Monmouth N J Inst for Exploratory Research
Hans A. Bomke, Henry A. Blake, Arthur K. Harris, William H. Hulse, and Duane J. Sheppard. 1967, 6p
Availability: Published in Journal of Geophysical Research, v72 n23 p5913-8 Dec 1 1967.

Descriptors: (*Solar eclipses, Magnetic fields), Ionization, Magnetometers, Helium, Recombination reactions, Ions, Density, Atmospheric sounding, Intensity, Mathematical analysis, Peru.

The horizontal component of the geomagnetic field, measured on the ground at two stations near the path of totality, reached the greatest departure from its normal value shortly after maximum eclipse in the nearby E layer. The magnitude of this departure is consistent with the generally accepted hypothesis that the eclipse-induced current system is located near the 100-km level. A determination was made of the lag from the time when the E-layer eclipse occurred at the theoretically optimum location until the time of maximum observed magnetic effect, with corrections for induction delays. Using this time lag, along with the observed decrease in the E-layer ionization, the effective ion-recombination coefficient and the percentage of ionizing radiation remaining at totality were determined. The recombination coefficient was found to be 5.5 (plus or minus x 10 to the minus 8th power cu cm/sec) and the residual coronal radiation 15 (plus or minus 3)%. (Author)
AD-667 107 Not available from CFSTI.

HODOGRAPHIC TREATMENT OF THE RESTRICTED THREE BODY PROBLEM, PHASE 2 FINAL REPORT.
General Electric Co., Philadelphia, Pa. Missile and Space Div.
S. P. Altman. 20 Jun 67, 236p NASA-CR-61615, DIN-67SD4304
Contract NAS8-20360

Descriptors: *Hodographs, *Orbital mechanics, *Three body problem, *Vector spaces, Celestial mechanics, Elliptical orbits, Hyperbolic trajectories.

For abstract, see STAR 06 09.
N68-18781 HC$3.00 MF$0.65

A FORTRAN PROGRAM FOR COMPUTATION OF MASS IN EARTH ORBIT REQUIRED FOR INTERPLANETARY MISSIONS.
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
For primary bibliographic entry see Field 22A.
For abstract, see STAR 06 09.
N68-19330 HC$3.00 MF$0.65

EFFECT OF EARTH OCCULTATION ON ASTRONOMICAL OBSERVATIONS FROM EARTH ORBIT.

Bellcomm, Inc., Washington, D. C.
For primary bibliographic entry see Field 3A.
For abstract, see STAR 06 09.
N68-19353 HC$3.00 MF$0.65

LUNAR SOLAR PERTURBATIONS OF A 24 HOUR SATELLITE.
National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
For primary bibliographic entry see Field 22C.
For abstract, see STAR 06 09.
N68-19355 HC$3.00 MF$0.65

ON SECULAR ACCELERATION OF PERIODICAL MOTION OF COMETS.
Volt Technical Corp., Washington, D. C.
A. D. Dubyago. 18 Mar 68, 12p NASA-CR-93471, ST-COM-CM-10681
Contract NAS5-12487
Tran- Transl. Into English From Astron. Zh. (USSR), 1948 P 362-368

Descriptors: *Comets, *Long term effects, *Periodic variations, Eccentricity, Orbit perturbation, Perturbation theory, Planetary gravitation.

For abstract, see STAR 06 09.
N68-19357 HC$3.00 MF$0.65

4. ATMOSPHERIC SCIENCES

4A. Atmospheric Physics

A STUDY OF THE MECHANISMS OF WHISTLER PROPAGATION AND VLF EMISSION GENERATION.
Final rept., 1 Oct 66-30 Sep 67,
Stanford Univ Calif Stanford Electronics Labs
Robert A. Helliwell. Jan 68, 14p
AFOSR-68-0219
Grant AF-AFOSR-783-67

Descriptors: (*Whistlers, Propagation), Magnetosphere, Interactions, Reflection, Attenuation, Scientific satellites, Ionospheric propagation, Ionospheric disturbances, Charged particles, Very low frequency.

Extensions to the theory of vlf propagation in the magnetosphere with the effects of ions included have explained dispersion characteristics of magnetospherically-reflected (MR) whistlers, a complex phenomenon discovered recently with satellites. Because its dispersion depends on both electron and ion distributions, as well as on the static magnetic field, the MR whistler may be useful as a new tool in the study of the magnetosphere. It was found that the sharp cutoff of ducted whistlers at half the minimum gyrofrequency on the path is often accompanied by whistler amplification and generation of discrete vlf emissions near the cutoff frequency. Satellite data show that ducts are not required for the generation of discrete vlf emissions and that the region of generation most likely lies near the top of the line of force thru the satellite. Observations of artificially-stimulated emission on the ground show that their occurrence peaks up when the minimum gyrofrequency is twice the triggering frequency. A new theory was advanced to explain the generation of discrete vlf emissions and is based on cyclotron resonance between electrons in the kev energy range and a longitudinally propagating wave.
AD-666 648 HC$3.00 MF$0.65

INSTRUMENTATION FOR AIR DENSITY MEASUREMENTS.
Final rept. 1 Jun 64-31 May 67,
Utah Univ Salt Lake City Upper Air Research Labs
Clay D. Westlund, Obed C. Haycock, Russell L. Smith, and Glenn D. Allred. Sep 67, 82p Rept no. UU67-6
AFCRL-67-0532
Contract AF 19 (628)-4055

Descriptors: (*Sounding rockets, Upper atmosphere), (*Upper atmosphere, Density), Measurement, High altitude, Launching, Densimeters, Spheres, Shock (Mechanics), Accelerometers, Telemeter systems, Drag, Design, Pulse transmitters, Electromagnetic pulses, Transformers, Antennas, Timing devices, Computer programs.
Identifiers: Fortran.

This report details an operational system for measuring air density at altitudes above those investigated by instrumented balloons and below those investigated by orbiting satellites. The system described is a 7-inch, rigid, falling sphere which is ejected from a rocket and falls through the atmosphere. Measurements directly related to air density are obtained by using a transit time accelerometer and related electronics incorporated within the sphere. The system has been used for a total of twenty-eight flights during this reporting period and has provided air density measurements between 20 and 120 km. (Author)
AD-666 649 HC$3.00 MF$0.65

BIBLIOGRAPHY OF AFCRL PUBLICATIONS FROM 1 JULY 1966 TO 30 SEPTEMBER 1967.
Air Force Cambridge Research Labs L G Hanscom Field Mass
For primary bibliographic entry see Field 5B.
AD-666 664 HC$3.00 MF$0.65

ROCKET AND SATELLITE TECHNIQUES FOR MEASUREMENT OF ELECTRON DENSITY AND RELATED IONOSPHERIC PARAMETERS.
Final rept. 1 Apr 65-31 Mar 67,
Utah Univ Salt Lake City Upper Air Research Labs
David A. Burt, Glenn D. Allred, and Clay D. Westlund. Dec 67, 94p Rept no. UU67-9
AFCRL-68-0010
Contract AF 19 (628)-5044

Descriptors: (*Sounding rockets, Atmospheric sounding), (*Scientific satellites, Atmospheric sounding), Electrons, Ionospheric disturbances, Ionization, Resonance, Radio waves, Density, Solar eclipses, Calibration, Telemeter systems, Instrumentation, Launching, Solar eclipses, Payload.
Identifiers: OV2-3 satellites, OV3-2 satellites, Aerobee, Nike-Hydacs rockets, Javelin, Titan 3, Scout, F-region, D-region.

Normal concentrations of electron density in the earth's ionosphere and changes in these concentrations associated with various disturbances, both natural and man made, have been investigated by a series of eight rocket and satellite payloads. Instruments for measuring fine scale, long term deviations and short term, larger scale deviations in electron density and other related parameters have been included in each payload. This report details instrumentation and presents brief results of the experiments developed by Upper Air Research Laboratory, University of Utah, for each of the following programs: Aerobee 150 (3.614) D-region, gyro-interaction; Four Nike-Hydacs solar eclipse (12 November 1966); OV2-3 Satellite electron density at sychronous orbit altitude; OV3-2 Satellite F-region electron density (polar orbit); Javelin (19.191) F-region irregularities - pulse-phase delay experiment. (Author)
AD-666 671 HC$3.00 MF$0.65

ROCKET MEASUREMENTS OF LOW ENERGY AURORAL ELECTRON ENERGY SPECTRA.
Final rept. 28 Oct 66-15 Oct 67,
American Science and Engineering Inc Cambridge Mass
William P. Reidy, and E. Richard Hegblom. 31 Oct 67, 41p Rept no. ASE-1764
AFCRL-67-0618
Contract F19628-67-C-0127
Research supported in part by DASA.
Availability: Includes papers submitted to Annales de Geophysique and Journal of Geophysical Research.

Descriptors: (*Atmospheric sounding, *Aurorae), Sounding rockets, Electron density, Apogee, Resolution, Radiation measurement systems, Alaska, Canada.
Identifiers: Fort Churchill (Canada), Fort Wainwright, Fairbanks (Alaska), Nike-Iroquois rockets, Astrobee 200 rockets.

The results of the analysis of data obtained from three rocket measurements of the energy spectra of auroral electrons are presented. An electrostatic analyzer measured the differential electron intensity over the energy range from 1 to 35 keV with an energy resolution of 10%. The differential spectra observed over the energy range from 2-34 keV during a rocket flight at Fort Churchill, Canada, in December 1966 (apogee 210 km) were relatively soft, with a peak intensity below 3keV and an approximately exponential decrease at higher energies. Two other measurements were made from rockets launched from Fort Wainwright, Fairbanks, Alaska, in October 1965. In one flight (apogee 138 km) the measured spectra were extremely soft with less than 1% of the electron flux above 6 keV, while on the other flight, (apogee 101 km) the measured electron flux appeared to be composed of at least two spectral components, one of which was highly variable. The system and pre-launch tests performed on the electrostatic analyzer and the ion chamber which were launched on Astrobee-200 - AE 15.735 are discussed. (Author)
AD-666 695 Not available from CFSTI.

THE RADIO EMISSIONS FROM CLOSE LIGHTNING,
Stanford Research Inst Menlo Park Calif
George N. Oetzel, and Edward T. Pierce. Feb 68, 46p Rept no. Scientific Note-10
Contract Nonr-4099 (00)
Availability: Published in International Conference on Universal Aspects of Atmospheric Electricity (4th), Tokyo (Japan), May 1968.

Descriptors: (*Lightning, *Radiofrequency interference), Noise (Radio), Atmospheric electricity, Resonance, Electromagnetic pulses, Very low frequency, Low frequency, Medium frequency, High frequency, Very high frequency, Superhigh frequency.

This survey considers the frequency range from below 1 kHz to above 10 GHz. At all frequencies the peak amplitude of the noise accompanying a single flash is examined. The structure and amplitude distribution of the separate pulses occurring within a complete discharge are investigated with particular reference to frequencies exceeding some 3 MHz. Among special topics discussed are the excitation of Schumann resonances, the generation of slow tail signals at frequencies less than 1 kHz, and the production of pulses at VLF (3-30 kHz) by return-strokes and other features of a lightning flash. Conclusions and recommendations for further work are given. (Author)
AD-666 711 Not available from CFSTI.

LENINGRAD UNIVERSITY. HERALD, VOL. 19, NO. 22, PHYSICS AND CHEMISTRY SERIES, No O. 4, 1964.
Foreign Technology Div Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 20H.
AD-666 727 HC$3.00 MF$0.65

REPORT OF THE NOVEMBER 1965 TEST FIRING SERIES PROJECT HARP,
Mcgill Univ Montreal (Quebec) Space Research Inst
H. J. Luckert. Nov 66, 267p Rept no. SRI-R-20
Contract DA-18-001-AMC-746 (X)

Descriptors: (*Sabot projectiles, Atmospheric sounding), Gun launched, Wind, Ionosphere, Telemeter systems, Sounding rockets, Reliability (Electronics), Acceleration, Projectile trajectories,

Interior ballistics, Experimental data, Correlation techniques, Firing tests (Ordnance), Rocket propellants, Symposia.
Identifiers: *High altitude research program, Trimethyl-aluminum, Martlet 3B Projectiles, HARP, *Gun launched projectiles, Graphs (Charts).

A review and analysis of results of the fourteenth test firing series of Project HARP with the Barbados 16 inch gun. The series consisted of twenty-seven rounds, fired in the period from 10 to 23 November 1965. Fifteen rounds carried TMA release payloads for wind measurements in two night series. A further round had a Cesium payload with a point release for ionospheric studies. The remaining eleven rounds were for engineering development tests of a sea-impact payload (two rounds), the self-destruct system (three rounds), an ejection system with a parachute telemetry package (three rounds). Two rounds carried a telemetry package to measure time pulses and temperatures in the electronics section and to test a high gain differential amplifier, in one of these rounds in addition to the TMA payload in the synoptic series. Finally two test slugs were fired as engineering tests of the gun and another propellant whereby also a new method of loading, by inserting spacers between the propellant bags, was tried out. (Author)
AD-666 744 HC$3.00 MF$0.65

AEROSPACE APPLICATION OF GUN LAUNCHED PROJECTILES AND ROCKETS,
Mcgill Univ Montreal (Quebec) Space Research Inst
Charles H. Murphy, and Gerald V. Bull. Feb 68, 46p Rept no. SRI-R-24
Prepared for presentation at the American Astronautical Society Symposium 'Future Space Programs and Impact on Range Network Development,' N. Mex., Mar 1967. Paper no. 67-38.

Descriptors: (*Sabot projectiles, Atmospheric sounding), Gun launched, Sensors, Terrestrial magnetism, Temperature, Electrons, Density, Payload, Accuracy, Symposia, Ionosphere, Wind, Parachutes, Sounding rockets, Acceleration, Costs, Modification kits.
Identifiers: *High altitude research program, HARP, *Gun launched projectiles.

Project High Altitude Research Program (HARP) is directed toward the use of guns for scientific probing of the upper atmosphere. The attractive features of guns for this purpose are the basic economy of such a system and the high inherent accuracy of guns for placement at altitude as well as accuracy in ground impact. The basic liability for such an approach lies in the very high accelerations experienced by gun-launched payloads. The guns used in Project HARP vary in size from 5-inch and 7-inch extended guns on mobile mounts to transportable fixed 16-inch guns. Altitude performance varies from 20 pound, 5-inch projectiles reaching 240,000 feet to 185-pound, 16-inch projectiles reaching 590,000 feet. Scientific results to date are primarily wind profiles measured by radar chaff, aluminized balloons and parachutes, and tri-methyl-aluminum trails, although a number of successful 250 MHz and 1750 MHz telemetry flights have been made. (Author)
AD-666 746 HC$3.00 MF$0.65

TRANSIENT TEMPERATURE BEHAVIOR OF THE THERMAL RADIOMETER.
Technical rept.,
Army Electronics Command Fort Monmouth N J
Reinhold Marchgraber. Dec 67, 36p Rept no. ECOM-2917

Descriptors: (*Sky brightness, Radiometers), (*Radiometers, Temperature), (*Thermocouples, Radiometers), Light, Transients, Time, Mathematical models, Analog computers, Experimental data, Design, Equilibrium, Heat transfer.
Identifiers: Pyronometers, Pyrheliometers.

Radiometers with thermal (caloric) receivers show transients when exposed to changes in the temperature of their environment which falsify the measurement of radiant fluxes. Based on experimental observation, a simple mathematical model is developed. Instrumented on the analog computer, this model confirms and extends the experimental findings and indicates areas of improvements in radiometer design. The time integral of the transient is found to depend solely on the temperature difference between states of thermal equilibrium of the radiometer with its environment and not on the rate of change between these states. (Author)
AD-666 771 HC$3.00 MF$0.65

PROGRAM IN ATMOSPHERIC ELECTRICITY AND CLOUD MODIFICATION FLAGSTAFF - 1966.
Final rept.,
Illinois State Water Survey Urbana
D. M. A. Jones. 15 Jun 67, 117p
ECOM-02376-F
Contract DA-28-043-AMC-02376 (E)

Descriptors: (*Atmospheric electricity, Arizona), Thunderstorms, Raindrops, Particle size, Distribution, Clouds, Radiosondes, Spectrometers, Reflectivity, Photography, Wind, Artificial precipitation, Radar reflections, Electric fields, Measurement, Silver compounds, Iodides.
Identifiers: Flagstaff (Arizona).

The report summarizes the data collection and preliminary analyses of various activities under Army support which were carried out in the Flagstaff area in the summer of 1966. A number of investigators have provided reports of their activities which have been combined into one volume. Basic studies were undertaken to study the raindrop-size distribution, radar echo climatology, and chloride particle concentrations by the Water Survey. Infra-red measurements, electrical measurements of clouds, and chaff seeding were carried on by the Army. The results of the field program provided additional information concerning meteorological conditions pertinent to precipitation of the Flagstaff area as well as additional support that chaff seeding influences the electrical fields of growing cumulus clouds. The resulting drop-size measurements suggested a different distribution of raindrops on several days which are either due to silver iodide seeding by another group in the area or from the evaporation of the falling drops. (Author)
AD-666 795 HC$3.00 MF$0.65

LASER SCINTILLATION CAUSED BY TURBULENCE NEAR THE GROUND.
Michigan Univ Ann Arbor Dept of Mathematics
For primary bibliographic entry see Field 20E.
AD-666 798 HC$3.00 MF$0.65

PROCEEDINGS OF THE OAR RESEARCH APPLICATIONS CONFERENCE, 21 MARCH 1968. VOLUME I.
Institute for Defense Analyses Arlington Va
For primary bibliographic entry see Field 5B.
AD-666 800 HC$3.00 MF$0.65

ELECTRON-TEMPERATURE DEPENDENCE OF ELECTRON-ION RECOMBINATION IN NEON,
Pittsburgh Univ Pa Dept of Physics
For primary bibliographic entry see Field 7D.
AD-666 876 Not available from CFSTI.

PARAMETERS GOVERNING THE GENERATION OF FREE VORTICES.
Revised ed.,
TRW Systems Redondo Beach Calif
Paul Dergarabedian, and Francis Fendell. 31 Jul 67, 10p
AROD-6453:5
Contract DAHC04-67-C-0015
Revision of report dated on 20 Oct 66.
Availability: Published in The Physics of Fluids, v10 n11 p2293-9 1967.

Descriptors: (*Vortices, *Convection (Atmospheric)), Diffusion, Laminar flow, Two-dimensional flow, Navier-Stokes equations, Atmosphere models, Momentum.

An asymptotic expansion of the Navier-Stokes equations is proposed which provides a new basis for previously stated free-vortex equations. Two main parameters emerge from the description of vortex generation. One is a conventional Ekman number, and the other indicates that unless the product of the area of the updraft and the average vertical gradient of the vertical velocity greatly exceeds the kinematic viscosity coefficient, no localized vortical flow develops. Although the model is largely axially invariant, the isobars described by the model are easily shown to have a funnel-cloud-like shape. Finally it is proposed that the analysis (although laminar) may suggest the counterforces basic to the generation of concentrated geophysical vortices: a vertical updraft induces a radial inflow, which may concentrate ambient angular momentum into a vortex unless turbulent viscous forces counteract the intensification. (Author)
AD-666 890 Not available from CFSTI.

THE 11-YEAR SOLAR MODULATION OF COSMIC RAYS AS DEDUCED FROM NEUTRON MONITOR VARIATIONS AND DIRECT MEASUREMENTS AT LOW ENERGIES,
New Hampshire Univ Durham Dept of Physics
John A. Lockwood, and William R. Webber. Dec 67, 18p Rept no. Scientific-7
AFCRL-68-0051
Contract AF 19 (628)-2352
Availability: Published in Journal of Geophysical Research, v72 n23 p5977-89 Dec 1967.

Descriptors: (*Cosmic rays, Modulation), Statistical analysis, Neutron detectors, Periodic variations, Upper atmosphere, Solar disturbances.

The variation in the cosmic-ray intensity recorded by neutron monitors from 1958 to 1965 was investigated to deduce the form of the solar modulation of the cosmic radiation. The neutron monitor data were carefully selected and examined. The observed quarter-year average changes in the intensity at the neutron-monitor stations were then compared with the calculated changes using different modulation functions. Finally, the observed variations in the intensities recorded by neutron monitors were compared with the variations of the radiation observed at the top of the atmosphere and in space. The change in both the neutron monitor intensity and the primary cosmic-radiation can be described by a modulation of the form exp (-K/P) in the rigidity range $0.5<P<50$ Gv. (Author)
AD-666 892 Not available from CFSTI.

OXYGEN ABSORPTION IN THE BAND FROM 53.4 TO 56.4 GHz.
Aerospace Corp El Segundo Calif Lab Operations
For primary bibliographic entry see Field 20N.
AD-666 916 HC$3.00 MF$0.65

COMPARISON BETWEEN EXPERIMENTAL AND CALCULATED SPECTRA OF CARBON DIOXIDE AND WATER VAPOR,
Denver Univ Colo Dept of Physics
For primary bibliographic entry see Field 7D.
AD-666 929 HC$3.00 MF$0.65

MEASUREMENT OF CLOUD REFLECTANCE PROPERTIES AND THE ATMOSPHERIC ATTENUATION OF SOLAR AND INFRARED ENERGY.
Final rept. Sep 65-Dec 67,
General Dynamics/Convair San Diego Calif
M. Griggs, and W. A. Marggraf. Dec 67, 165p
AFCRL-68-0003
Contract AF 19 (628)-5517

Descriptors: (*Atmosphere, Solar radiation), (*Clouds, Reflectivity), (*Solar radiation, Attenua-

tion), Spectra (Visible + ultraviolet), Spectra (Infrared), Transport planes, Visibility, Radiometers, Surface temperatures, Emissivity, Polarization, Terrain, Albedo, Particle size, Distribution, High altitude, Interferometers, Aerial cameras, Tables.
Identifiers: C-47 aircraft.

The results of measurements made with an instrumented DC-3 aircraft are presented and discussed. In the infrared 8 to 14 microns 'window' region, both the integrated and spectral radiances of different surfaces were measured as a function of altitude to 18,000 feet, and compared with a theoretical model. Surface temperature measurements were made in order to determine the mean emissivity of stratus clouds, the ocean, the desert, and snow, in the 'window' region. In the visible region, the albedos of the above surfaces, plus forest and grass surfaces, were determined from measurements of the total down and total up fluxes of solar radiation. The total down flux measurements are compared with a theoretical model. The directional reflectivity and polarization of stratus clouds, the ocean, and snow, were determined as a function of wavelength in the visible region. These optical properties of clouds are related to cloud properties such as thickness, liquid water content, and droplet size distribution. Stratus cloud radiances determined with an aerial camera on a U2 at altitudes up to 65,000 feet are analyzed. (Author)
AD-666 936 HC$3.00 MF$0.65

STUDY OF COLLISION PROCESSES IN GASEOUS PLASMAS.
Minnesota Univ Minneapolis Dept of Electrical Engineering
For primary bibliographic entry see Field 20I.
AD-666 946 HC$3.00 MF$0.65

BEHAVIOR OF A HIGH LATITUDE HYDROMAGNETIC WAVE PHENOMENON OBSERVED AT CONJUGATE LOCATIONS.
Technical memo.,
Earth Sciences Labs Boulder Colo
W. H. Campbell. Dec 67, 14p Rept no. ESL-6

Descriptors: (*Ionosphere, Magnetohydrodynamics), Ionospheric disturbances, Electron density, Absorption, Correlation techniques, High altitude, Canada, Antarctic regions, Aurorae, Attenuation, Electromagnetic waves, Ionospheric propagation.

The study is a summary of the characteristics of the pc 1 geomagnetic field pulsation phenomenon in the 0.15 to 3.5 c/s frequency range with emphasis on the behavior at auroral latitudes. That the detected emissions are manifestations of resonant hydromagnetic wave propagation on the earth's field lines is evidenced by the preferred simultaneous occurrence at conjugate field locations. The occurrence times of high latitude emissions indicate that the excitation is on the sun side of the magnetosphere. The resonance frequency changes uniformly with local time. There seems to be coupling to other than field-guided propagation modes when the waves reach ionospheric altitudes. Large auroral associated absorption appreciably attenuates the signals. Present problems in understanding the pc 1 phenomenon are discussed. (Author)
AD-666 953 HC$3.00 MF$0.65

CHARGE-EXCHANGE LIFETIMES FOR LOW-ENERGY PROTONS IN THE OUTER RADIATION ZONE AND IMPLICATIONS CONCERNING THE DENSITY OF ATOMIC HYDROGEN IN THE TERRESTRIAL EXOSPHERE,
Iowa Univ Iowa City Dept of Physics and Astronomy
R. L. Swisher, and L. A. Frank. Jan 68, 34p Rept no. 68-3
Contracts Nonr-1509 (06), NAS5-2054

Descriptors: (*Van Allen Radiation Belt, Protons), (*Exosphere, Hydrogen), Radiation measurement systems, Scientific satellites, Charged particles, Magnetic storms, Density, Particle trajectories, Atmosphere models, Life expectancy.
Identifiers: OGO 3 satellite.

The directional, differential intensities of protons over the energy range of about 200 eV to 50 keV injected into the outer radiation zone (i.e., the extraterrestrial ring current) coincident with the initial phase of the geomagnetic storm during early July 1966 were monitored with a sensitive array of electrostatic analyzers borne on the earth-satellite OGO 3. Proton intensities are greatly enhanced throughout the outer radiation zone for L-values approximately equal or > 3 during the main phase of this moderate magnetic storm, and the injection mechanism ceases to be effective after the storm main phase for L-values approximately equal or < 5.5. The proton (30 = or < E = or < 50 keV) intensities are shown to exponentially decay with lifetimes ranging from 15 to 105 hours in substantial agreement with calculated lifetimes invoking measured charge-exchange cross-sections for protons incident upon atomic hydrogen and a model of the atomic hydrogen density in the earth's exosphere. The atomic hydrogen density model for the terrestrial exosphere providing the best fit to the observed proton lifetimes over geocentric radial distances 2.5 to 4.8 earth radii (corresponding to observed densities of about 200 to 30 hydrogen atoms/cc) allows only atoms in ballistic orbits in the exosphere as opposed to a model geocorona which includes an additional atomic hydrogen population in captive elliptical orbits. (Author)
AD-666 964 HC$3.00 MF$0.65

AN INTENSE AURORAL ZONE X-RAY EVENT IN THE 4-5 SEC PERIOD RANGE.
Revised ed.,
California Univ Berkeley Dept of Physics
R. R. Brown, and R. A. Weir. 19 Feb 68, 9p
AFOSR-68-0539
Grant AF-AFOSR-331-65
Revision of report dated 18 Mar 67.
Availability: Published in Journal of Atmospheric and Terrestrial Physics v29 p1611-8 1967.

Descriptors: (*Cosmic ray bursts, Measurement), (*Aurorae, X rays), Power spectra, Magnetic fields, Electrons, Charged particles, Interactions, Pulse height analyzers, Scintillation counters, Balloons.
Identifiers: Micropulsations.

In the magnetic activity following the September 2, 1966 PCA event, an intense auroral zone X-ray pulsation event was observed in the 4-5-sec period range. Comparison of this event with the temporal features of micropulsations in the same period range does not support the suggestion that pulsating electron precipitation arises from processes directly involving micropulsation fields. (Author)
AD-667 053 Not available from CFSTI.

THREE-DIMENSIONAL MONTE CARLO SIMULATION OF EXTENSIVE AIR SHOWERS.
Interim rept.,
Massachusetts Inst of Tech Cambridge Lab for Nuclear Science
Hale V. Bradt, and Saul A. Rappaport. 25 Dec 67, 18p
AFOSR-68-0574
Contracts F44620-67-C-0020, AT (30-1)-2098
Availability: Published in The Physical Review, v164 n5 p1567-83 25 Dec 67.

Descriptors: (*Cosmic rays, Simulation), (*Nuclear reactions, Cosmic rays), Monte Carlo method, Interactions, Muons, Pions, Protons, Baryons, Iron, Correlation techniques.
Identifiers: *Air showers.

A three-dimensional Monte Carlo simulation of extensive air showers (EAS) with primary energies between 10 to the 14th power and 10 to the 16th power eV was made. The experimentally observable effects of three interaction models and two primary particles (Fe and proton) have been determined. In all, some 500 simulated EAS at three primary energies were analyzed at two atmospheric depths: 530 and 970 g/cm sq. This analysis yielded average lateral distributions and energy spectra of nuclear-active particles (n.a.p.) and muons, together with the extent of the fluctuations in these quantities. The calculations also yielded the size of each EAS. This, in turn, enabled us to calculate measurable quantities normalized to shower size for comparison with experimental data. The principal results and conclusions are given.
AD-667 065 Not available from CFSTI.

NUCLEAR EXPLOSIONS IN AN IONOSPHERE WITH FINITE ELECTRIC CONDUCTIVITY IN THE PRESENCE OF A UNIFORM MAGNETIC FIELD.
Innsbruck Univ. (Austria). Inst. for Theoretical Physics.
For primary bibliographic entry see Field 18C.
For abstract, see STAR 06 09.
N68-18284 HC$3.00 MF$0.65

MATHEMATICAL WIND PROFILES.
Lockheed-california Co., Burbank.
G. E. Abrahams, A. Court, and R. R. Read. Feb 68, 34p NASA-CR-61195
Contract NAS8-5380

Descriptors: *Fourier analysis, *Mathematical models, *Polynomials, *Vertical motion, *Wind profiles, Augmentation, Integral transformations, Linear equations, Wind (meteorology), Wind velocity measurement.

For abstract, see STAR 06 09.
N68-18486 HC$3.00 MF$0.65

COSMIC RAY INTENSITY VARIATIONS DURING 1966.
Uppsala Univ. (Sweden). Cosmic Ray Group.
E. Dyring, O. Larfors, S. Lindgren, A. E. Sandstroem, and B. Sporre. 25 Sep 67, 35p SN-4, AFCRL-68-0016
Contract AF 61/052/-868

Descriptors: *Cosmic rays, *Diurnal variations, *Neutron counters, *Particle telescopes, *Periodic variations, Flux (rate).

For abstract, see STAR 06 09.
N68-18524 HC$3.00 MF$0.65

DETERMINATION OF PARAMETERS OF NOCTILUCENT CLOUDS SURVEYED IN 1964.
Opredeleniye Parameter Serebristykh Oblakov V 1964 G
Aztec School of Languages, Inc., Acton, Mass.
M. I. Burov. Mar 68, 19p NASA-TT-F-11520
Contract NASW-1692
Tran- Transl. Into English From the Publ. "meteorologicheskiye Issledovaniya- Serebristyye Oblaka" Moscow, Nauka Press, 1966 P 33-46

Descriptors: *Noctilucent clouds, *Photogrammetry, *Stereophotography, Applications of mathematics, Geodetic coordinates, Imaging techniques, Triangulation, Upper atmosphere.

For abstract, see STAR 06 09.
N68-18821 HC$3.00 MF$0.65

ANALYSIS OF POLAR CAP ABSORPTION EVENTS. 3 - TIME RELATION OF RF-H ALPHA MAXIMUM INTENSITY FOR ALL CM BURSTS MORE THAN OR EQUAL TO 500 TIMES 10-22 W/M2C/S/-1 QUARTERLY REPORT.
LTV Aerospace Corp., Dallas, Tex. Astronautics Div.
F. C. Jonah. 12 Oct 66, 35p NASA-CR-65996, REPT.-00.865
Contract NAS9-4911

Descriptors: *Polar cap absorption, *Radio emission, *Spectrum analysis, Flux (rate), Light (visible radiation), Luminous intensity, Polar caps, Tables (data).

For abstract, see STAR 06 09.
N68-18824 HC$3.00 MF$0.65

INSTRUCTION MANUAL FOR IONOSPHERIC DRIFT MEASUREMENTS. THE DETERMINATION OF IONOSPHERIC DRIFTS FROM THREE-RECEIVER FADING RECORDS.
Adelaide Univ. (Australia). Dept. of Physics.
B. H. Briggs. 1967, 38p ADP-42

Descriptors: *Autocorrelation, *Cross correlation, *Fading, *Ionospheric drift, *Manuals, *Wave dispersion, Fourier analysis, Frequencies, Receivers, Vector analysis.

For abstract, see STAR 06 09.
N68-18905 HC$3.00 MF$0.65

RESULTS OF INCLUDING A BOUNDARY SHOCK WAVE IN THE CALCULATION OF THE FLIGHT PARAMETERS OF A LARGE HIGH-SPEED METEOR.
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
E. D. Martin. Mar 68, 58p NASA-TN-D-4325
Contract 124-07-02-23-00-21

Descriptors: *Atmospheric entry, *Boundary layer flow, *Meteoroids, *Shock waves, *Trajectory analysis, Ablation, Aerodynamic coefficients, Conservation equations, Drag, Heat transfer coefficients, Vaporizing.

For abstract, see STAR 06 09.
N68-18997 HC$3.00 MF$0.65

DIFFUSE REFLECTION AND TRANSMISSION BY CLOUD AND DUST LAYERS.
Harvard Coll. Observatory, Cambridge, Mass.
W. M. Irvine. Feb 66, 27p NASA-CR-70496
Grant NSG-89-60
Conf- Presented At Symp. on the Interdisciplinary Aspects of Radiative Energy Transfer, Philadelphia

Descriptors: *Cloud cover, *Dust, *Optical paths, *Photon beams, *Probability distribution functions, *Radiative heat transfer, Absorption spectra, Aerosols, Atmospheric composition, Charged particles, Diffraction paths, Diffusivity, Multiplexing, Planetary atmospheres.

For abstract, see STAR 06 09.
N68-19219 HC$3.00 MF$0.65

THE IDENTIFICATION OF MOVING MAGNETIC FIELD LINES.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
For primary bibliographic entry see Field 8N.
For abstract, see STAR 06 09.
N68-19274 HC$3.00 MF$0.65

A THERMOMETRIC FILM SIMULATOR AND AN APPLICATION TO THE FILM MOUNT OF THE ARCASONDE 1 A SENSOR PROGRESS REPORT.
Utah Univ., Salt Lake City. Dept. of Electrical Engineering.
S. Kikkawa, and F. L. Staffanson. Nov 67, 59p NASA-CR-66579, UTEC-MR-67-079
Contract NGR-45-003-025

Descriptors: *Computer programs, *Conductive heat transfer, *Convective heat transfer, *Temperature distribution, *Time dependence, Computerized simulation, Fortran, Radioactivity, Rocket sounding, Sondes, Temperature profiles, Thermistors, Thin plates.

For abstract, see STAR 06 09.
N68-19338 HC$3.00 MF$0.65

ON THE UPPER LIMIT OF ANTINUCLEI CONTENT IN COSMIC RAYS.
Volt Technical Corp., Washington, D. C.
For primary bibliographic entry see Field 20H.
For abstract, see STAR 06 09.
N68-19358 HC$3.00 MF$0.65

CERTAIN ASPECTS IN THE INVESTIGATION OF NOCTILUCENT CLOUDS.
Nekotoryye Aspekty Issledovaniya Serebristykh Oblakov
National Aeronautics and Space Administration, Washington, D. C.
CH. I.Willmann. Feb 68, 19p NASA-TT-F-11517
Tran- Transl. Into English From the Publ. "meteorologicheskiye Issledovaniya. Serebristyye Oblaka, No. 12" Moscow, Nauka Press, 1966 P 11-25

Descriptors: *Climatology, *Kinematics, *Noctilucent clouds, Chemical properties, Geometry, Optical properties, Particle motion.

For abstract, see STAR 06 09.
N68-19359 HC$3.00 MF$0.65

STUDIES OF IONOSPHERIC ABSORPTION MEASUREMENTS.
Illinois Univ., Urbana. Aeronomy Lab.
J. S. Shirke. 1 Oct 67, 132p NASA-CR-93694
Grant NSG-511
Seri- Its Aeronomy Rept. No. 22

Descriptors: *Abnormalities, *Electromagnetic absorption, *Ionospheric composition, *Ionospheric sounding, Electron density (concentration), Ionospheric propagation, Sounding rockets, Upper atmosphere.

For abstract, see STAR 06 09.
N68-19396 HC$3.00 MF$0.65

OGO-2 MAGNETIC FIELD OBSERVATIONS DURING THE MAGNETIC STORM OF MARCH 13-15, 1966.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
For primary bibliographic entry see Field 8N.
For abstract, see STAR 06 09.
N68-19435 HC$3.00 MF$0.65

NCAR PUBLICATIONS, AVAILABLE STOCKS, JULY 1967.
National Center for Atmospheric Research, Boulder, Colo. Publications Dept.
1967, 40p

Descriptors: (*Meteorology, Reports), Tornadoes, Thunderstorms, Energy, Aurorae, Air pollution, Clouds, Chromosphere, Atmospheric motion, Atmospheric precipitation, Terrestrial magnetism, Electromagnetic waves, Fluid mechanics, Balloons, Particles, Gas analysis, Wind, Water, Ozone, Spectroscopy, Cosmic rays, Astronomy, Ionization.

The document lists publications which cover the atmospheric sciences solar physics, and allied subjects. (Author)
PB-176 957 HC$3.00 MF$0.65

4B. Meteorology

ANNUAL CONFERENCE ON WEATHER EFFECTS ON AIRCRAFT SYSTEMS (2ND). A COMPILATION OF THE PAPERS PRESENTED SEPTEMBER 18 AND 19, 1962.
Naval Air Turbine Test Station, Trenton, N. J. Aeronautical Turbine Lab.
1962, 114p

Descriptors: (*Aircraft engines, Symposia), (*Turbojet engines, Meteorological parameters), (*Turboprop engines, Meteorological parameters), Environmental tests, Stratosphere, Wind, Temperature, Water, Ingestion (Engines), Jet fighters, Test methods, Ice prevention, All-weather aviation, Naval aircraft, Thunderstorms, Flight testing, Ice, Naval research.
Identifiers: J-79 engines, F-8 aircraft, Convair 880 aircraft.

This compilation contains copies of the technical papers presented at the second annual conference on weather effects on aircraft systems sponsored by the U. S. Naval Air Turbine Test Station, Trenton, New Jersey. The conference was held on the 18th and 19th of September 1962. (Author)
AD-461 803 HC$3.00

THE CLIMATE OF THE RUPUNUNI SAVANNAS.
Technical rept. on Savanna Research Project, Mcgill Univ Montreal (Quebec) Dept of Geography
David B. Frost. Mar 68, 101p Rept nos. TR-13, Savanna Research Series-12
Contract Nonr-3855 (00)
See also Technical Report no. 11, AD-666 617.

Descriptors: (*Climatology, South America), Rainfall, Solar radiation, Humidity, Wind, Meteorological charts, Mountains, Clouds, Atmospheric temperature, Periodic variations, Soils, Moisture, Plants (Botany).
Identifiers: Savannas.

The climate of the Rupununi savannas is closely examined with particular reference to the effects on moisture conditions of the wet and dry seasons. Two areas are selected where the forest savanna boundary might be climatically controlled. The first is the windward side of the Kanuku Mountains and the other the lee of the Pakaraima Mountains. At the foot of the Kanuku Mountains forest vegetation displays a tendency to extend onto the level savanna surface while savanna tends to extend into the mountains of the Pakaraimas. It was therefore anticipated that the first area would be wetter and the second area dryer than the open savanna. Although the former rainfall is only slightly greater, it is shown from a study of the water balance that the area has only half of the moisture deficit experienced by the savannas during the dry season. It is also demonstrated that in the lee of the Pakaraimas rainfall is so reduced that soil moisture recharge may only rarely be complete. In this instance the aridity is markedly greater than in the savannas. A similar situation seems to exist in the lee of the Kanuku Mountains but is not proved. It is concluded that the uncharacteristic location of the forest savanna boundary in both of these areas is largely due to the differences in the moisture regime caused by the changes in climate. (Author)
AD-666 616 HC$3.00 MF$0.65

INERTIAL CHARACTERISTICS OF THE WINDS AND THEIR PREDICTIVE IMPLICATIONS FOR THE WATER MOVEMENTS OFF SOUTHWEST AFRICA.
Technical rept. 1 Jan-31 Dec 67,
Ocean-Atmosphere Research Inst Cambridge Mass
Irving I. Schell. 15 Jan 68, 21p Rept no. OARI-1-68
Contract N00014-67-C-0334

Descriptors: (*Marine meteorology, Wind), (*Ocean currents, Africa), Surface temperatures, Distribution, Seacoast, Periodic variations, Salinity, Predictions, Symposia.
Identifiers: Upwelling, Southwest Africa.

The report gives a summary of work done on correlations of the winds off the west coast of South Africa with the strength of the Benguela Current and associated upwelling as well as the northwestward penetration of the Agulhas Current water round the Cape from the Indian Ocean into the South Atlantic, from a consideration of surface temperatures during 1951-1961. Preliminary re-

sults obtained from this study are to be presented at the April 1-5 meeting of the joint American, British, German meteorological societies and the German Geophysical Society in Hamburg. (Author)
AD-666 631 HC$3.00 MF$0.65

THE POLAR OCEANS AND WORLD CLIMATE,
Rand Corp Santa Monica Calif
J. O. Fletcher. Mar 68, 61p Rept no. P-3801
Prepared for presentation at Symposium on Beneficial Modifications of Marine Environment, Washington, D. C., 11 Mar 68.

Descriptors: (*Climatology, Earth (Planet)), (*Polar regions, Ice), Symposia, Albedo (Astronomy), Periodic variations, Air mass analysis, Arctic Ocean, Antarctic regions, Thermodynamics, Solar radiation, Atmospheric motion, Atmosphere models.
Identifiers: Heat budget, Weather modification, *Pack ice.

The following topics are discussed with the aid of numerous quantitative graphs depicting energy exchange between the ocean and the atmosphere and energy loss to space. (1) The physical reasons why the presence or absence of ice on the sea influences climate-forming processes. (2) Some questions associated with pack ice in the Arctic Ocean: How much does it vary. What causes these variations and how do they influence global climate. If the pack ice were removed, would it reform or would the Arctic Ocean remain an open sea. (3) Variations in the extent of sea ice around the Antarctic continent, how it varies, and how these variations may influence global climate. (4) Long-term changes of global climate and extent of pack ice. (5) Possibilities for artificially influencing large-scale climatic processes by influencing the extent of ice on the sea. (Author)
AD-666 653 HC$3.00 MF$0.65

BIBLIOGRAPHY OF AFCRL PUBLICATIONS FROM 1 JULY 1966 TO 30 SEPTEMBER 1967.
Air Force Cambridge Research Labs L G Hanscom Field Mass
For primary bibliographic entry see Field 5B.
AD-666 664 HC$3.00 MF$0.65

LOW LEVEL THICKNESS CHARTS,
Weather Wing (7th) Kansas City Mo Detachment 42
Charles M. Umpenhour. 18 Jan 68, 12p

Descriptors: (*Weather forecasting, *Meteorological charts), Thickness, Jet streams (Meteorology), Temperature, Barometric pressure, Thunderstorms, Atmospheric precipitation, Periodic variations, Snow, Distribution, Volume, Surface temperatures, Predictions.
Identifiers: Thickness (Meteorology).

The study discusses low level thickness charts from plotting and analysis procedures through some prognostic suggestion. Included in the study are aids to forecasting the type of precipitation, snowfall amounts and areas, temperature, thunderstorms, and gusty surface winds. (Author)
AD-666 707 HC$3.00 MF$0.65

MONTHLY MICROCLIMATIC SUMMARY JULY 1967. ENVIRONMENTAL DATA BASE FOR REGIONAL STUDIES IN THE HUMID TROPICS,
Army Tropic Test Center Fort Clayton Canal Zone
Michael A. Fradel, and Wilfried H. Portig. Jan 68, 28p
ARPA Order-740

Descriptors: (*Climatology, Tropical regions), Atmospheric temperature, Barometric pressure, Atmospheric precipitation, Wind, Air pollution, Soils, Diurnal variations, Velocity, Humidity, Evaporation, Tables, Panama.

The report contains detailed microclimatic data for July 1967 from specific sites in the Panama Canal Zone and vicinity. The data are presented in tabular form, summarized for hourly and/or daily observations from surface to 46-meter levels. Elements listed are: temperature, pressure, precipitation, wind speed and direction, relative humidity, and evaporation. (Author)
AD-666 764 HC$3.00 MF$0.65

HARMONIC ANALYSIS OF PRECIPITATION.
Technical rept.,
Army Electronics Command Fort Monmouth N J
Marvin J. Lowenthal. Nov 67, 34p Rept no. ECOM-2893

Descriptors: (*Atmospheric precipitation, Periodic variations), North America, Harmonic analysis, Transcendental functions, Analysis of variance, Mathematical prediction, Meteorological charts.

Periodicities in monthly precipitation over North America are investigated using harmonic analysis. The long term means are expressed by a trigonometric function (cosine or sine) with periods of 12, 6, and 4 months. Amplitudes and phase angles are examined with the goodness of fit determined by analyzing the residual variances after the application of one, two, and three harmonics. The variation of precipitation in the interior of North America may be satisfactorily expressed as a simple cosine curve with a summer maximum and an amplitude of about one inch. Adding the second and third harmonic reduces the residual variance to less than 20% in all but three small scattered areas. The physical reasoning behind this mathematical technique is not immediately evident since synoptic phenomena occurring at three-month intervals are not clear. (Author)
AD-666 772 HC$3.00 MF$0.65

PROGRAM IN ATMOSPHERIC ELECTRICITY AND CLOUD MODIFICATION FLAGSTAFF 1966.
Illinois State Water Survey Urbana
For primary bibliographic entry see Field 4A.
AD-666 795 HC$3.00 MF$0.65

PROCEEDINGS OF THE OAR RESEARCH APPLICATIONS CONFERENCE, 21 MARCH 1968. VOLUME I.
Institute for Defense Analyses Arlington Va
For primary bibliographic entry see Field 5B.
AD-666 800 HC$3.00 MF$0.65

FOREIGN SCIENCE BULLETIN, VOL. 4, NO. 3, 1968.
Library of Congress Washington D C Aerospace Technology Div
For primary bibliographic entry see Field 20G.
AD-666 875 HC$3.00 MF$0.65

BIBLIOGRAPHY ON THE CLIMATE OF BRITISH EAST AFRICA (KENYA, TANGANYIKA, UGANDA, AND ZANZIBAR).
Weather Bureau Washington D C
1955, 34p Rept no. WB/BC-1

Descriptors: (*Climatology, Subsaharan Africa), Atmospheric temperature, Atmospheric precipitation, Rainfall, Wind, Weather stations, Atmospheric motion, Clouds, Weather forecasting, Hail, Storms, Kenya, Tanganyika, Zanzibar, Bibliographies.
Identifiers: Uganda.

The document lists 115 reports by title and author, and includes descriptive comments concerning the content of these reports.
AD-666 893 HC$3.00 MF$0.65

ARCTIC BIBLIOGRAPHY.
Weather Bureau Washington D C
V. J. Creasi. 1968, 162p Rept no. WB/BC-10

Descriptors: (*Climatology, Arctic regions), Atmospheric temperature, Snow, Permafrost, Ice islands, Diurnal variations, Barometric pressure, Glaciers, Oceanology, Geology, Hydrographic surveying, Meteorological parameters, Bibliographies, Abstracts, Symposia.

The document lists annotated summaries of various reports and symposia concerning the climate, geomorphology, and oceanography of the Arctic region.
AD-666 894 HC$3.00 MF$0.65

BIBLIOGRAPHY ON THE CLIMATE OF INDOCHINA,
Weather Bureau Washington D C
Annie E. Grimes. Jun 57, 74p Rept no. WB/BC-30

Descriptors: (*Climatology, Southeast Asia), Atmospheric temperature, Barometric pressure, Atmospheric precipitation, Weather forecasting, Rainfall, Fog, Tropical cyclones, Wind, Thunderstorms, Laos, Cambodia, Vietnam, Meteorological charts, Bibliographies.

The document lists 129 reports by title and author, and includes descriptive comments concerning the content of these reports.
AD-666 895 HC$3.00 MF$0.65

THE DEVELOPMENT OF A CONSTITUTIVE RELATION FOR NEOPRENE BALLOON FILM,
New York Univ N Y Dept of Aeronautics and Astronautics
Harold Alexander. Jul 67, 69p Rept nos. Scientific-1, NYU-AA-67-108
AFCRL-67-0573
Contract F19628-67-C-0241

Descriptors: (*Meteorological balloons, Films), (*Synthetic rubber, Mechanical properties), Deformation, Elasticity, Mathematical analysis, Elastomers, Hydrostatic pressure, Stresses, Viscoelasticity, Strain (Mechanics).

The physical and mechanical characteristics of neoprene film, a commonly used expandable-type balloon skin material, are presented for the purpose of developing constitutive equations that can be used in balloon analyses. 'Day' balloon film is found to be an almost perfectly elastic material through an extremely large range of deformations. A survey of previously proposed elastic constitutive equations for rubber-like materials is presented and all are found to be inadequate for neoprene. Consequently, a new constitutive relation based on the attempts of previous investigators and experiments performed by the author is proposed. It is shown to be a generalization of most earlier theories. (Author)
AD-666 930 HC$3.00 MF$0.65

ALBERTA HAIL STUDIES 1966,
Mcgill Univ Montreal (Quebec) Stormy Weather Group
A. J. Chisholm, Marianne English, Walter Hitschfeld, J. Pell, and N. H. Thyer. May 67, 83p Rept nos. Scientific-2, MW-49
AFCRL-67-0657
Contract F19628-67-C-0129

Descriptors: (*Hail, Canada), Storms, Atmospheric precipitation, Temperature, Intensity, Distribution, Wind, Meteorological radar, Weather, Mathematical analysis, Radiosondes, Graphics, Meteorological charts.

A new method is presented for evaluating double theodolite pibals, using all four theodolite angles to locate the most likely position of the balloon. The calculation may be done graphically, once a special chart has been compiled, so straightforward calculations of wind are possible without use of a computer. Pell: Although some storms may generate hail continuously, in the manner of the Wokingham storm of Browning and Ludlam, there

are cases of storms which produce intermittent hailswaths disrupted by patches of only rain. Closely related to the problem of swath continuity is that of continuity of hailfall at a point. Again, reports have been recorded which indicate that frequently hail falls in 'bursts' separated by periods of either rain or no precipitation at all. Chisholm: A study of radar echo maxima in two Alberta hailstorms has shown that the storms consisted of several storm 'families', each containing small intense radar echo 'cores' or cells. These cells developed preferentially on the right flank of the family, moving across the track of the family at an acute angle to dissipate near the left flank; identifiable lifetimes of the cells were 20-30 minutes. There appeared to be a cycle of development of the cells, which had a considerable effect on the overall storm-family velocity. (Author)
AD-666 934 HC$3.00 MF$0.65

CBE FACTORS: MONTHLY SURVEY NO. 22.
Library of Congress Washington D C Aerospace Technology Div
For primary bibliographic entry see Field 15B.
AD-666 991 HC$3.00 MF$0.65

THE ROLE OF PRESSURE GRADIENT IN THE DEVELOPMENT OF A BREEZE,
Foreign Technology Div Wright-Patterson AFB Ohio
A. F. Dyubyuk, and T. B. Seznev. 17 Nov 67, 15p Rept no. FTD-MT-24-305-67
Edited machine trans. of Meteorologiya i Gidrologiya (USSR) n7 p11-8 1962.

Descriptors: (*Meteorology, Sea breeze), Fluid mechanics, Wind, Production, Barometric pressure, Mathematical analysis, Equations of motion, Periodic variations, Friction, Turbulence, USSR.
Identifiers: Translations, Pressure gradients.

The problem of relationship between the pressure gradient and breeze development is explored. Formulas are presented describing each phase in the development of this phenomenon. (Author)
AD-667 075 HC$3.00 MF$0.65

AN ANALYSIS OF THE ROUGHNESS LENGTH ASSOCIATED WITH THE NASA 150-METER METEOROLOGICAL TOWER.
National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
G. H. Fichtl. 3 Jan 68, 27p NASA-TM-X-53690

Descriptors: *Cape kennedy launch complex, *Length, *Surface roughness, *Towers, *Wind velocity measurement, Atmospheric turbulence, Wind direction, Wind profiles.

For abstract, see STAR 06 09.
N68-18784 HC$3.00 MF$0.65

METEOROLOGICAL MEASURING AND RECORDING EQUIPMENT DESCRIPTION, CALIBRATION, AND MAINTENANCE PROCEDURES FOR NASA'S 150 METER METEOROLOGICAL TOWER FACILITY, KENNEDY SPACE CENTER, FLORIDA.
National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
15 Feb 68, 117p NASA-TM-X-60903, GP-465

Descriptors: *Cape kennedy launch complex, *Maintenance, *Meteorological instruments, *Recording instruments, Calibrating, Documentation, Electronic equipment, Manuals, Meteorological services, Towers.

For abstract, see STAR 06 09.
N68-18928 HC$3.00 MF$0.65

FOG DISPERSAL OVER AIRPORT RUNWAYS BY A MECHANICAL METHOD.
Royal Aircraft Establishment, Farnborough (England).
For primary bibliographic entry see Field 1E.
For abstract, see STAR 06 09.
N68-19059 HC$3.00 MF$0.65

MEASUREMENTS OF WINDS AND TEMPERATURES AT ALTITUDES UP TO 65 KILOMETERS IN THE SOUTHERN HEMISPHERE.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
L. W. Chamberlain, and J. C. Manning. Mar 68, 61p NASA-TN-D-4429
Contract 607-06-00-01-23

Descriptors: *Radiosondes, *Southern hemisphere, *Temperature measurement, *Wind velocity, Atmospheric composition, High altitude, Meteorological charts, Meteorological instruments, Rocket sounding, Tables (data).

For abstract, see STAR 06 09.
N68-19084 HC$3.00 MF$0.65

ANALYSIS OF APOLLO AS-501 MISSION EARTH PHOTOGRAPHY.
National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.
For primary bibliographic entry see Field 14E.
For abstract, see STAR 06 09.
N68-19451 HC$3.00 MF$0.65

MORPHOLOGICAL STUDIES OF NOCTILUCENT CLOUDS.
Morfologicheskiye Issledovaniya Serebristykh Oblakov
National Aeronautics and Space Administration, Washington, D. C.
N. I. Grishin. Feb 68, 14p NASA-TT-F-11523
Tran- Transl. Into English From the Publ. "meteorologicheskiye Issledovaniya Serebristyye Oblaka, No. 12" Moscow, Nauka Press, 1966 P 92-100

Descriptors: *Noctilucent clouds, *Shapes, *Structural analysis, *Surface geometry, Cloud physics, Earth atmosphere, Luminescence, Thermodynamics.

For abstract, see STAR 06 09.
N68-19491 HC$3.00 MF$0.65

NCAR PUBLICATIONS, AVAILABLE STOCKS, JULY 1967.
National Center for Atmospheric Research, Boulder, Colo. Publications Dept.
For primary bibliographic entry see Field 4A.
PB-176 957 HC$3.00 MF$0.65

TEST AND EVALUATION OF THE MORTARBOARD PSYCHROMETER.
Final rept.,
Weather Bureau, Sterling, Va. Test and Evaluation Lab.
Walter E. Hoehne, and Roger A. Tucker. Jan 68, 25p WBTM-T/EL-3

Descriptors: (*Weather forecasting, *Hygrometers), Humidity, Thermometers, Measurement, Temperature, Accuracy, Wind, Velocity, Atmospheric precipitation, Test methods, Costs, Shielding, Moisture.
Identifiers: Mortarboard psychrometers.

The mortarboard psychrometer was developed by the Southern Forest Fire Laboratory as a simple, accurate, inexpensive means of obtaining wet- and dry-bulb temperature readings to be used in estimating fine fuel moisture. A number of commercially available psychrometers were tested by the Southern Forest Fire Laboratory; each produced accurate readings when carefully operated, but they were either too expensive, too fragile, too hard to operate, or required ventilated shelters. These undesirable features led to the development and testing of the mortarboard psychrometer. (Author)
PB-177 689 HC$3.00 MF$0.65

A PROPOSED METHOD OF ESTIMATING CLOUD-TOP TEMPERATURE, CLOUD COVERS, EMISSIVITY, AND CLOUDNESS FROM SHORT- AND LONG WAVE RADIATION DATA OBTAINED BY MEDIUM-RESOLUTION SCANNING RADIOMETERS,
Chicago Univ., Ill. Satellite and Mesometeorology Research Project.
Tetsuya Fujita, and Hector Grandoso. Nov 67, 55p SMRP-48
Grants Cwb-WBG-34, NsG-333

Descriptors: (*Meteorological satellites, *Micrometeorology), (*Micrometeorology, *Radiometers), Air mass analysis, Mathematical analysis, Thermal radiation, Reflectivity, Emissivity, Cloud cover, Clouds, Cloud height indicators, Meteorological parameters, Climatology, Weather forecasting, Analog systems, Spectra (Infrared).
Identifiers: Medium resolution scanning radiometers, Tiros satellites, High resolution infrared radiometers.

With the knowledge that the basic approach to the interpretation of radiation data varies significantly according to the horizontal dimensions of the meteorological systems under investigation, a complete analysis of radiation data has been attempted taking into consideration the spatial response of the sensors and cloud cover inside their field of view. It was revealed that the cloud cover observed varied according to the spectral responses of the radiometers, thus necessitating the establishment of radiometric cloud covers which can be identified as the equivalent reference cloud cover (smallest), the equivalent blackbody cloud cover, and the photographic cloud cover (largest). It was found that the ratio of the first and second cloud covers for faint cirrus clouds is very small, but increases to 1.0 as the clouds become denser and thicker. Thus this ratio, which can be used to identify clouds, is called the 'cloudness' which is in fact not 'cloudiness.' As a result of this study, it became evident that the equivalent blackbody temperatures from Medium Resolution Radiation data cannot always be used as the cloud-top temperatures because of the varying emissivity of clouds and their partial coverage of the radiometer's field of view. (Author)
PB-177 752 HC$3.00 MF$0.65

5. BEHAVIORAL AND SOCIAL SCIENCES

5A. Administration and Management

LIFT FAN FLIGHT RESEARCH AIRCRAFT.
General Electric Co., Cincinnati, Ohio.
For primary bibliographic entry see Field 1C.
AD-461 017 HC$3.00

DUALITY IN DISCRETE PROGRAMMING. III. NONLINEAR OBJECTIVE FUNCTION AND CONSTRAINTS.
Research rept.,
Carnegie-Mellon Univ Pittsburgh Pa Management Sciences Research Group
Egon Balas. Feb 68, 25p Rept no. RR-121
Contract Nonr-760 (24)
See also Part 2, AD-665 318.

Descriptors: (*Management engineering, *Mathematical programming), Theory, Nonlinear programming, Inequalities, Optimization, Management planning, Theorems, Operations research.

The results of 'Duality in Discrete Programming,' are extended in this paper (which, however, is self-contained) to the case of dual programs with nonlinear objective function and nonlinear constraints. The symmetric dual nonlinear programs studied by Dantzig, Eisenberg and Cottle, as well as the dual nonlinear programs formulated by Wolfe, Mangasarian and Huard are generalized by allow-

ing some of the variables to be constrained to belong to arbitrary sets of real numbers, and dropping the requirement that the objective function and the constraints be convex (concave) in these variables. The basic properties established for the above problems are shown to carry over, with some qualification, to their generalized counterparts which encompass, among others, various types of mixed-integer nonlinear programs. (Author)
AD-666 627 HC$3.00 MF$0.65

CONFIGURATION MANAGEMENT OF COMPUTER PROGRAM CONTRACT END ITEMS,
Electronic Systems Div L G Hanscom Field Mass
Technical Requirements and Standards Office
For primary bibliographic entry see Field 9B.
AD-666 652 HC$3.00 MF$0.65

COST FUNCTIONS AND BUDGETS (COST CONSIDERATIONS IN SYSTEMS ANALYSIS),
Rand Corp Santa Monica Calif
G. H. Fisher. Feb 68, 42p Rept no. P-3789
Prepared for presentation to a conference on the Economic Analysis of Public Products at Princeton University in April 1968, sponsored by the Universities-National Bureau of Economic Research Committee on Production and Distribution of Public Products.

Descriptors: (*Management planning, *Cost effectiveness), Symposia, Aircraft industry, Economics, Decision making, Budgets, Systems engineering, Sampling, Department of Defense, Data processing systems, Operations research.
Identifiers: Systems analysis.

Systems analysis forms the central core of a program budgeting activity. A vitally important part of systems analysis is a cost analysis capability to generate estimates of the resource impact of alternative courses of action being considered for the distant future. Some of the principal characteristics of a systems cost analysis capability are given. Establishing and maintaining a cost analysis capability to support systems analysis studies involves numerous difficulties. One of the most troublesome is the data base problem. Solution to parts of the data problem may be through major overhaul of present formal information systems and through the establishment of new complete enumeration systems. This, however, does not appear feasible as a general solution--at least in the foreseeable future. Short of such major efforts are numerous alternative possibilities. Some examples are given.
AD-666 656 HC$3.00 MF$0.65

A CHANCE-CONSTRAINED APPROACH TO CAPITAL BUDGETING WITH PORTFOLIO TYPE PAYBACK AND LIQUIDITY CONSTRAINTS AND HORIZON POSTURE CONTROLS,
Northwestern Univ Evanston Ill Systems Research Group
For primary bibliographic entry see Field 12B.
AD-666 840 Not available from CFSTI.

SOME NEW APPROACHES TO RISK,
Carnegie Inst of Tech Pittsburgh Pa Management Sciences Research Group
For primary bibliographic entry see Field 12B.
AD-666 841 Not available from CFSTI.

BIBLIOGRAPHY OF MANAGEMENT ANALYSIS REPORTS, NOTES AND MEMORANDA.
Management analysis memo.,
Office of the Director of Defense Research and Engineering Washington D C Office for Lab Management
Claudette N. Guilford. 15 Mar 68, 10p Rept no. ODDRE-MAM-68-2
Supersedes AD-653 740. Report no. MAM-67-2 dated 15 May 67.

Descriptors: (*Management engineering, Bibliographies), Department of Defense, Personnel management, Manpower, Laboratories, Management control systems, National defense, Decision making, Operations research.
AD-667 174 HC$3.00 MF$0.65

AN EVALUATION OF THE COMMUNITY EDUCATION DEMONSTRATION PROJECTS.
Final rept. 30 Jun 67-29 Feb 68,
Data Systems Research, Inc., New York.
Ronald D. Wynne. Feb 68, 203p
Contract OEO-4223

Descriptors: (*Management planning, Education), (*Decision making, Public opinion), Statistical data, Economics, Reaction (Psychology), Mobilization, Training, Adults, Adolescents, Children, Instructors, Kentucky, New York, Oklahoma, Pennsylvania, North Carolina, Alabama.
Identifiers: Community education demonstration projects, Office of Economic Opportunity, Appalachia, New England, Schools.

The report summarizes a six-month evaluation (July - December 1967) of eleven community education projects funded by the Office Economic Opportunity. Eight of the projects comprised a special series of Section 207 Community Education Demonstration Projects, and were the major focus of this evaluation. The other three projects were suggested for evaluation by the OEO project manager because of their similarity to the special series. One was funded under Section 205 as a delegate agency of a CAA; one under Section 206 as a training program; and the third under Section 207. This latter program was in the process of phasing out at the time the evaluation began. (Author)
PB-177 678 HC$3.00 MF$0.65

INFORMATION NEEDS: THE INTERSTATE HIGHWAY MOTORIST IN IOWA,
Little (Arthur D.), Inc., Cambridge, Mass.
William E. Griswold. Nov 67, 76p ADL-C-69499
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Roads, *Public relations), Commerce, Distribution, Dissemination, Display systems, Economics, Passenger vehicles, Questionnaires, Public opinion, Human engineering.
Identifiers: Infosites, Information centers, Billboards, Advertising, Interstate highways.

The study evaluated the effectiveness of two information centers 'Infosites' located at rest areas on Interstate 80 in Iowa. The 'Infosites' are being operated as a profit-making venture by a private outdoor advertising company. The author concludes that the 'Infosite' as it is presently conceived is not self-supporting. At the time the study was being conducted only 20 percent of the advertising space had been sold. Under the outdoor advertising company's price structure, at least 60 percent was necessary to break even. According to the author one of the reasons that the 'Infosite' is experiencing financial difficulty is that advertisers in the area are committed to the large billboards located beyond 660 feet of the right-of-way. Interviews with motorists at the 'Infosites' revealed that they considered it a convenient and effective means of obtaining information. The 'Infosite' was classified as a 'good idea' by 99 percent of the persons interviewed. The primary complaint was that the amount and nature of the information offered was too limited. The author recommends that State-sponsored information centers be built at main highway entrances to the State and outdoor bulletin boards with individual advertising panels to be displayed at rest areas. (BPR Abstract)
PB-177 708 HC$3.00 MF$0.65

THE PUBLIC'S SHARE IN SHAPING EDUCATIONAL POLICY: A PILOT STUDY.
System Development Corp., Santa Monica, Calif.
For primary bibliographic entry see Field 5I.
PB-177 731 HC$3.00 MF$0.65

MANAGEMENT RESEARCH STUDY FOR THE DELAWARE STATE HIGHWAY DEPARTMENT. VOLUME I.
Management Technology, Inc., Washington, D. C.
For primary bibliographic entry see Field 13B.
PB-177 758 HC$3.00 MF$0.65

5B. Documentation and Information Technology

SOVIET CYBERNETICS: RECENT NEWS ITEMS, NO. 15,
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 6D.
AD-666 654 HC$3.00 MF$0.65

BIBLIOGRAPHY OF AFCRL PUBLICATIONS FROM 1 JULY 1966 TO 30 SEPTEMBER 1967.
Special reports no. 73,
Air Force Cambridge Research Labs L G Hanscom Field Mass

Feb 68, 173p Rept no. AFCRL-68-0095

Descriptors: (*Air Force research, Bibliographies), Indexes, Reports, Instrumentation, Meteorology, Microwaves, Optics, Solid state physics, Astrophysics, Geophysics.
Identifiers: Announcement bulletins.

This bibliography lists all in-house reports, journal articles, and contractor reports issued from 1 July 1966 to 30 September 1967. Part I lists all in-house reports by the series in which they were issued; Part II lists all in-house reports, journal articles, and contractor reports by the Laboratory responsible for their preparation. In Part I, the reports are listed numerically by series; in Part II, in-house reports and journal articles are listed alphabetically by author, and contractor reports are listed numerically by the AFCRL report number. (Author)
AD-666 664 HC$3.00 MF$0.65

DESIGNATIONS OF ALLOYS FOR THE AEROSPACE INDUSTRY (REVISED),
Battelle Memorial Inst Columbus Ohio Defense Metals Information Center
For primary bibliographic entry see Field 11F.
AD-666 682 HC$3.00 MF$0.65

GENERAL RESEARCH.
Quarterly technical summary rept. 1 Nov 67-31 Jan 68,
Massachusetts Inst of Tech Lexington Lincoln Lab
Frederick C. Frick, V. Alexander Nedzel, Stephen H. Dodd, Malvin A. Herlin, and Jerome Freedman. 15 Feb 68, 53p
ESD-TR-68-10
Contract AF 19 (628)-5167
See also AD-664 057.

Descriptors: (*Data processing systems, Reports), (*Physics, Reports), (*Radar, Reports), (*Engineering, Reports), (*Solid state physics, Reports), Scientific research, Digital computers, Man-machine systems, Space surveillance systems, Radio astronomy, Microwave equipment, Control systems, Mechanical engineering.

The summary covers the period from 1 November 1967 through 31 January 1968. It consolidates the reports of Data Systems, Radio Physics, Radar, Engineering, and Solid State physics on the General Research Program at Lincoln Laboratory.
AD-666 712 HC$3.00 MF$0.65

CONTEMPORARY IRAQ REFERENCE BOOK.
Department of the Navy Washington D C
For primary bibliographic entry see Field 5D.
AD-666 728 HC$3.00 MF$0.65

PROCEEDINGS OF THE OAR RESEARCH APPLICATIONS CONFERENCE, 21 MARCH 1968. VOLUME I.
Institute for Defense Analyses Arlington Va
21 Mar 68, 394p
OAR-68-001-Vol-1

Descriptors: (*Air force research, *Symposia), Guided missiles, Aircraft defense systems, Display systems, Plasma medium, Microorganisms, Gas chromatography, Tactical warfare, Clear air turbulence, Meteorological radar, Superconductors, Atmosphere entry, Radio communication systems, Aerodynamics, Wind tunnels, Solar disturbances, Lasers, Weather forecasting.
Identifiers: Gas dynamics.

The scientific papers published in this document illustrate some of the ways in which the results of OAR research can be applied to the solution of technological problems. The papers are: 'Principles and Applications of the Plasma Display Panel' by D. L. Bitzer and H. G. Slottow; 'Detection and Identification of Microorganisms by Gas Chromatography' by J. R. Gould; 'The Optimal Solution of a Tactical Pursuit-Evasion Problem' by R. F. Vachino, D. H. deDoes, J. F. Schaefer, and G. Cook; 'Radar Investigation of Clear-Air Turbulence' by K. R. Hardy; 'Reentry Communication Studies and Recent Flight Test Results' by J. L. Poirier; 'An Investigation of Hypersonic Aerodynamics at High Altitudes' by S. M. Bogdonoff; 'Polygonal and Swept-Back Plates with Cut-Outs and Column Supports' by P. M. Quinlan; 'Observation and Forecasting of Solar Proton Events' by J. P. Castelli; 'Superconducting Metallurgy' by B. T. Matthias; 'High Energy Density Electrochemical Cells' by L. A. King, A. D. Brown, Jr., and F. H. Frayer; 'Lasers from II-VI Compounds' by D. C. Reynolds; 'Electron Beam Fluorescence Studies and their Application to Gas Dynamic Research' by E. P. Muntz; 'Estimating the Date of Onset of the Rainy Season in Southern South Vietnam' by I. A. Lund; and 'Improved Zirconia Refractories for Hypersonic Wind Tunnel Storage Heaters' by L. L. Fehrenbacher. (Author)
AD-666 800 HC$3.00 MF$0.65

ORGANIZATION OF TOPICS AND LITERATURE REFERENCES IN THE EARTH SCIENCES FOR MACHINE STORAGE AND RETRIEVAL.
Technical rept.,
Northwestern Univ Evanston Ill Dept of Geology
Giovanni B. LaMonica. Feb 68, 68p Rept no. TR-7
Contract Nonr-1228 (36)

Descriptors: (*Information retrieval, Hydrology), (*Data storage systems, Hydrology), Subject indexing, Structural geology, Geography, Classification, Punched cards, Coding, Rock (Geology), Water, Rivers, Geometric forms, Transport properties, Deposits, Climatology, Underground.
Identifiers: Geomorphology, Drainage basins, Lithology, Streams.

The report describes a system for organizing a set of topics and related literature references in a selected field of the earth sciences. The concept of a drainage basin was selected to illustrate a conceptually-distinct field of research of interest to geologists and physical geographers. Problems associated with coding and integration of the relevant literature are pointed out. The concept of a drainage basin, initially selected as a fairly self-contained subject, was found to be more complex than originally realized. To keep the report within reasonable bounds, the subject was subdivided into several major topics, which include first the geometry of the basin considered as a physical object definable as a natural subdivision of the earth's land surface. This is followed by various attributes associated with the basin, such as soils and bedrock, streams and subsurface water in the basin, and climatic features. The system used includes three types of punched cards. The first relates to the topics discussed, the second ties in the relevant literature, and the third provides comments and specific references to individual items. Machine print-outs provide tabulated examples of the system, and a condensed bibliography of drainage-basin literature is given. (Author)
AD-666 817 HC$3.00 MF$0.65

TECHNICAL PUBLICATIONS AND PRESENTATIONS, 1965.
Aerospace Research Labs Wright-Patterson AFB Ohio
1965, 33p
See also 1966 issue, AD-657 879.

Descriptors: (*Air force research, Bibliographies), Reports, Scientific research, Symposia, Theses, Periodicals, Chemistry, Fluid mechanics, Physics, Mathematics, Thermodynamics, Metallurgy, Ceramic materials.
Identifiers: Announcement bulletins.

Lists the technical reports, technical articles, papers presented, books/chapters of books, OAR research review articles, lectures and seminars (ARL speakers), guest speakers, and technical briefings, authored or co-authored by scientists of the Aerospace Research Laboratories, and published, presented or prepared in calendar year 1965. In addition, this edition includes a record of the Air Force Institute of Technology graduate student theses completed during the year under sponsorship of ARL.
AD-666 944 HC$3.00 MF$0.65

ABSTRACTING SCIENTIFIC AND TECHNICAL REPORTS OF DEFENSE-SPONSORED RDT/E.
Defense Documentation Center Alexandria Va
Mar 68, 19p

Descriptors: (*Reports, Processing), (*Abstracts, Processing), Information retrieval, Instruction manuals, Subject indexing, Documentation.

Abstracts of scientific and technical reports must be factual, accurate, clear, and concise so that they can effectively serve the research and development community in the present-day computer age. They must apprise the scientist of the content of the parent document; present to the documentalist appropriate technical terminology for his automatic processing of input and retrieval data; and provide a standardized item of information for easy interchange by the complex communication networks among the members of the R and D community. Abstracts may be informative or descriptive as needed. However, the preferred are the informative which give the objectives or purpose of the research, the methods of investigation, and the results and conclusions. Whenever possible, abstracts should be unclassified with no controls on their distribution. (Author)
AD-667 000 HC$3.00 MF$0.65

DEFENSE DOCUMENTATION CENTER FIVE YEAR PLAN STUDY. VOLUME I. FIVE YEAR PLAN.
Technical memo.
System Development Corp Falls Church Va
29 Aug 66, 65p Rept no. TM-WD-268/001/00
See also Volume 2, AD-667 171.

Descriptors: (*Documentation, State-of-the-art reviews), (*Data processing systems, Documentation), Information retrieval, Department of Defense, Management planning, Technical information centers, Digital computers, Punched cards, Abstracts, Bibliographies, Effectiveness, Real time, Automation.
Identifiers: Defense Documentation Center, On-line systems, Information management.

This document is the result of a three-month study by the System Development Corporation, conducted for the Defense Documentation Center (DDC). The report consists of three volumes: Volume I - Five Year Plan; Volume II - Needs and Requirements; Volume III - State of the Art Study. Volume I contains three alternative courses of action for the time period Fiscal Years 1967 - 1971. Estimates of workload, equipment, personnel, and costs are given to Fiscal Year 1971 for each of the alternatives. The Volume includes system improvements which should be made regardless of the alternative chosen and those which could be possible future developmental efforts at Defense Documentation Center.
AD-667 170 HC$3.00 MF$0.65

DEFENSE DOCUMENTATION CENTER FIVE YEAR PLAN STUDY. VOLUME II. NEEDS AND REQUIREMENTS.
Technical memo.
System Development Corp Falls Church Va

29 Aug 66, 87p Rept no. TM-WD-268/002/00
See also Volume 1, AD-667 170.

Descriptors: (*Documentation, State-of-the-art reviews), (*Data processing systems, Documentation), Information retrieval, Department of Defense, Management planning, Technical information centers, Digital computers, Computer operators, Computer programs, Processing, Automation, Real time, Flow charting, Bibliographies.
Identifiers: Defense Documentation Center, Announcement bulletins, UNIVAC 1107 computers.

This volume contains descriptions of current operations of the document system, the management information systems and the Automatic Data Processing (ADP) system. An assessment of the ADP system is included. Current Requirements are delineated in the form of existing directives and working agreements. Future Requirements are stated as possible alternative missions that could be undertaken by DDC in the next five years. Current Needs are postulated as those needs which should be met in the first two or three years to increase the effectiveness of the operations at DDC. Future Needs contains similar needs for improvements and developments in the three-to-five year period. (Author)
AD-667 171 HC$3.00 MF$0.65

DEFENSE DOCUMENTATION CENTER FIVE YEAR PLAN STUDY. VOLUME III. STATE OF THE ART STUDY.
Technical memo.
System Development Corp Falls Church Va
29 Aug 66, 164p Rept no. TM-WD-268/003/00

Descriptors: (*Documentation, State-of-the-art reviews), (*Data processing systems, Documentation), Information retrieval, Department of Defense, Management planning, Technical information centers, Digital computers, Programming languages, Computer storage devices, Punched cards, Cathode ray tubes, Multiple operation, Time sharing, Compilers.
Identifiers: Defense Documentation Center, Multiprocessing, FORTRAN, COBOL, PL/1 Programming languages, Information management.

This volume contains materials which are intended to provide aid to Defense Documentation Center (DDC) in its evaluation, selection and utilization of computer hardware and software. Section B depicts the most likely development of computer hardware in its organization, capabilities, and application during the next five years. Section C analyzes aspects of computer software of concern to DDC.
AD-667 172 HC$3.00 MF$0.65

DEFENSE DOCUMENTATION CENTER FIVE YEAR PLAN STUDY: APPENDIX.
Technical memo.,
System Development Corp Falls Church Va

R. Watson. 19 Sep 66, 16p Rept no. TM-WD-268/004/00
Availability: Microfiche only after original copies exhausted.

Descriptors: (*Documentation, *State-of-the-art reviews), (*Data processing systems, Documentation), Information retrieval, Department of Defense, Digital computers, Computer personnel, Programming languages, Technical information centers, Subroutines, Time sharing, Magnetic tape, Printing, Microfilm, Classification, Statistical data.
Identifiers: Defense Documentation Center, Thesauri, On-line systems.

This appendix contains recommendations for computer related developments in the next five years. Many of the developments are listed or implied under functional headings in other sections of the report. For the sake of clarity they are listed here in a single section. Some of these developments are expected to extend beyond the five year period.
AD-667 173 MF$0.65

ELECTRONIC SYSTEMS DIVISION HANDBOOK FOR SCIENTIFIC AND TECHNICAL INFORMATION (STINFO),
Electronic Systems Div L G Hanscom Field Mass Technical Requirements and Standards Office
Mary A. Rives, and Alfonzo L. Walls. Mar 68, 26p
ESD-TR-67-632

Descriptors: (*Documentation, Handbooks), Department of Defense, Air Force, Reports, Information retrieval, Distribution, Technical information centers, Organizations, Classification.
Identifiers: STINFO (Scientific and Technical Information), *Scientific and Technical Information.

The report is a general review of the Scientific and Technical Information Program. It was written primarily as a working guide for technical personnel producing or monitoring technical reports and STINFO Officers at the SPO and laboratory level. The report includes Department of Defense, Air Force and Air Force Systems Command policies, regulations and information sources; publication of reports; and release and distribution of reports. (Author)
AD-667 179 HC$3.00 MF$0.65

QUARTERLY BULLETIN OF THE DIVISION OF MECHANICAL ENGINEERING AND THE NATIONAL AERONAUTICAL ESTABLISHMENT.
National Research Council of Canada Ottawa (Ontario) Div of Mechanical Engineering
1968, 122p Rept no. DME/NAE-1967 (4)

Descriptors: (*Scientific research, Periodicals), (*Periodicals, Canada), Reports, Stress (Psychology), Decision making, Acoustics, Jet engine noise, Marine engineering, Ship hulls, Data processing systems, Human engineering, Pattern recognition, Engines + motors, Aeronautical laboratories, Bibliographies.

Contents: The effect of psychological stress on decision processes in a tracking task; The NAE acoustic test facility; Main hull girder loads on a Great Lakes bulk carrier; Current projects of the Division of Mechanical Engineering and the National Aeronautical Establishment.
AD-667 180 HC$3.00 MF$0.65

R AND D ABSTRACTS. VOLUME 20 NUMBER 24, 16-31 DECEMBER 1967.
Ministry of Technology London (England) Technical Information and Library Services
1968, 57p

Descriptors: (*Reports, *Abstracts), Great Britain, Psychology, Medicine, Data processing systems, Aerodynamics, Thermodynamics, Chemistry, Electrical engineering, Lasers, Rocket motors, Rocket propellants, Flight control systems, Materials, Metallurgy.
Identifiers: Announcement bulletins.
AD-667 182 HC$3.00 MF$0.65

ENGINEERING PROPERTIES OF CERAMICS. DATABOOK TO GUIDE MATERIALS SELECTION FOR STRUCTURAL APPLICATIONS.
Battelle Memorial Inst., Columbus, Ohio.
For primary bibliographic entry see Field 11B.
AD-803 765 HC$3.00 MF$0.65

A PILOT PROGRAM FOR SELECTING, EDITING, AND DISSEMINATING ENGINEERING AND SCIENTIFIC EDUCATIONAL SUBJECT MATTER FROM NASA TECHNICAL REPORTS QUARTERLY REPORT, 1 DEC. 1967 - 29 FEB. 1968.
Oklahoma State Univ., Stillwater. Coll. of Engineering.
29 Feb 68, 56p NASA-CR-93484, ER-68-I-2
Contract NSR-37-002-045

Descriptors: *Communicating, *Documents, *Industries, *Nasa programs, *Technologies, Aerospace sciences, Data acquisition, University program.

For abstract, see STAR 06 09.
N68-18667 HC$3.00 MF$0.65

EXPERIMENT TO TRANSFER TECHNOLOGY FROM A UNIVERSITY-BASED CENTER FINAL REPORT.
Indiana Univ. Foundation, Bloomington. Aerospace Research Applications Center.
J. Di Salvo. Feb 68, 37p NASA-CR-93482
Contract NASR-162

Descriptors: *Communicating, *Nasa programs, *Technologies, *University program, Documents, Industries, Information, Marketing.

For abstract, see STAR 06 09.
N68-18732 HC$3.00 MF$0.65

STANDARD INTEREST PROFILES - DEVELOPMENT OF TECHNICAL SUBJECTS FINAL REPORT.
Indiana Univ. Foundation, Bloomington. Aerospace Research Applications Center.
J. Di Salvo, and R. W. Hall. 25 Feb 68, 95p
NASA-CR-93480
Contract NSR-15-003-055

Descriptors: *Communicating, *Nasa programs, *Technologies, *University program, Abstracts, Industries, Information, Marketing, Profiles, Reports, Standardization.

For abstract, see STAR 06 09.
N68-18733 HC$3.00 MF$0.65

NOISE - EFFECTS ON MAN AND MATERIALS. A SELECTED BIBLIOGRAPHY.
National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
For primary bibliographic entry see Field 20A.
For abstract, see STAR 06 09.
N68-18952 HC$3.00 MF$0.65

HISTORIC AMERICAN BUILDINGS SURVEY.
National Park Service, Washington, D. C. Historic American Buildings Survey.
For primary bibliographic entry see Field 13M.
PB-177 632 HC$3.00 MF$0.65

HISTORIC AMERICAN BUILDINGS SURVEY. CATALOG OF THE MEASURED DRAWINGS AND PHOTOGRAPHS OF THE SURVEY IN THE LIBRARY OF CONGRESS, COMPRISING ADDITIONS SINCE MARCH 1, 1941.
National Park Service, Washington, D. C.
For primary bibliographic entry see Field 13M.
PB-177 633 HC$3.00 MF$0.65

SURVEY OF USERS AND SOURCES OF TRAFFIC SAFETY INFORMATION.
System Development Corp., Falls Church, Va.
For primary bibliographic entry see Field 13L.
PB-177 701 HC$3.00 MF$0.65

PROJECT DEFINITION PHASE STUDY FOR THE NATIONAL TRAFFIC SAFETY DOCUMENTATION CENTER.
General Electric Co., Santa Barbara, Calif. TEMPO.
For primary bibliographic entry see Field 13B.
PB-177 702 HC$3.00 MF$0.65

DOCUMENTATION CENTER, VOLUME I.
Michigan Univ., Ann Arbor. Highway Safety Research Inst.
For primary bibliographic entry see Field 13B.
PB-177 703 HC$3.00 MF$0.65

A FIELD EXPERIMENTAL APPROACH TO THE STUDY OF RELEVANCE ASSESSMENTS IN RELATION TO DOCUMENT SEARCHING.
Formal progress rept. no. 2, 1 Jan-30 Jun 66,
Western Reserve Univ., Cleveland, Ohio. Center for Documentation and Communication Research.
Alan M. Rees, and Douglas G. Schultz. 30 Jun 66, 38p
Contract NSF-C423

Descriptors: (*Information retrieval, Statistical analysis), Information centers, Documentation, Value engineering, Test methods, Simulation, Data processing systems, Symposia, Students, Libraries.

Efforts have been devoted to the formulation of a set of definitions and hypotheses which might serve as both a theoretical and an operational framework for the experimental activity. Our experience has indicated that relevance and the process of judging it can be described at present only in general terms. The purpose and justification of our research is, in fact, to collect data which might be analyzed and interpreted to provide a more precise knowledge of relevance and of the variables influencing relevance judgments. It is recognized that research in this area is difficult in view of the almost total absence of tested methodologies and established measures, the limited experimental experience and the multitude of both known and suspected variables. Our approach has, therefore, been to design a reasonably simple and well defined experiment which would permit the gathering under controlled conditions of a significant amount of data for subsequent statistical analysis. (Author)
PB-177 735 HC$3.00 MF$0.65

5C. Economics

U.S. ARMY AREA HANDBOOK FOR PANAMA.
American Univ., Washington, D. C. Foreign Area Studies Div.
For primary bibliographic entry see Field 5D.
AD-472 796 HC$3.00 MF$0.65

A DYNAMIC MODEL OF URBAN STRUCTURE,
Rand Corp Santa Monica Calif
John P. Crecine. Mar 68, 62p Rept no. P-3803

Descriptors: (*Urban areas, Mathematical models), (*Employment, Urban areas), (*Population, Urban areas), Economics, Transportation, Classification, Dynamics, Modification kits.
Identifiers: Zoning ordinances, *Time-Oriented Metropolitan Model, Area development and planning.

Versions of the Time-Oriented Metropolitan Model (T.O.M.M.) discussed in the paper have served as the primary spatial-location model for two, large-scale urban simulations. Because of the incompleteness, incompatibility, and non-existence of most small-area data and the lack of time-series data, T.O.M.M. remains in the developmental stage. Although two versions have been calibrated for Pittsburgh and Lansing, the version presented is untested and describes the latest model modifications. The model is one describing the interaction of variables in an urban system. Three classes of variables are included: an exogeneous employment sector, an endogenous commercial employment sector, and a household or population sector. (Author)
AD-666 655 HC$3.00 MF$0.65

COST FUNCTIONS AND BUDGETS (COST CONSIDERATIONS IN SYSTEMS ANALYSIS),
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 5A.
AD-666 656 HC$3.00 MF$0.65

CONTEMPORARY IRAQ REFERENCE BOOK.
Department of the Navy Washington D C
For primary bibliographic entry see Field 5D.
AD-666 728 HC$3.00 MF$0.65

CLASSIFICATION AND DISCRIMINATION IN THE ANALYSIS OF CREDIT RISKS: I.
Research rept.,
Carnegie-Mellon Univ Pittsburgh Pa Management Sciences Research Group
Giandomenico Majone. Feb 68, 21p Rept no. RR-120
Contract Nonr-760 (24)
Prepared in cooperation with Rome Univ. (Italy).

Descriptors: (*Money, Management planning), (*Management planning, *Mathematical analysis), Probability, Correlation techniques, Algorithms, Mathematical models, Classification, Group dynamics, Sampling.
Identifiers: Cluster analysis (Mathematics), Consumer credit management.

Clustering and classification techniques are introduced for the categorization of credit risks. A metric distance for qualitative characteristics is defined. Some shortcomings of clustering by maximum correlation are discussed. Connections between cluster analysis and algorithms of graph theory and of mathematical programming will be considered in a forthcoming supplement to this report. A second report will deal with discrimination of risk categories. (Author)
AD-666 809 HC$3.00 MF$0.65

A CHANCE-CONSTRAINED APPROACH TO CAPITAL BUDGETING WITH PORTFOLIO TYPE PAYBACK AND LIQUIDITY CONSTRAINTS AND HORIZON POSTURE CONTROLS,
Northwestern Univ Evanston Ill Systems Research Group
For primary bibliographic entry see Field 12B.
AD-666 840 Not available from CFSTI.

NATIONAL MONETARY SOVEREIGNTY AND INTERNATIONAL FINANCIAL ORDER,
Rand Corp Santa Monica Calif
Robert Z. Aliber. Mar 68, 19p Rept no. P-3791

Descriptors: (*Economics, Gold), Money, Commerce, Standards, Bargaining, United States, Decision making.

The problem discussed in this paper is whether the greater internationalization of decision-making in international financial arrangements, suggested in part by the change in the IMF voting arrangements, is consistent with what might be called the technology of international finance. The paper also examines the management problem of the international system under several different systems. The contrast between the model of how the existing system is supposed to operate and how it operates in practice is considered. The proposals for reform are evaluated, and the likely impact of the new agreements is assessed. Attention is also given to monetary sovereignty. (Author)
AD-666 901 HC$3.00 MF$0.65

ON DETERMINISTIC AND STOCHASTIC STRUCTURES.
Research memo.,
Princeton Univ N J Econometric Research Program
Camilo Dagum. Dec 67, 25p Rept no. RM-92
Contract N00014-67-A-0151
See also AD-661 826.

Descriptors: (*Economics, Stochastic processes), Probability, Set theory, Measure theory, Mathematical prediction, Mathematical models, Sociology, Behavior.
Identifiers: *Econometrics, Economic development.

The concept of a modern society as opposed to a traditional (backward) society and the idea of structural change underline nearly all up to date economic policies of development. The notion of structural change is at stake first of all in the current polemic on causes of inflation between the Latin American school of inflation (structuralist school) the more orthodox monetarist school. We can trace it also in the theoretical foundations of any economic policy. Nevertheless, the concept of structure has not a clearcut statement outside econometrics. The purpose of this paper is to develop a quantitative and operational concept of structure and, as a consequence, a quantitative and operational concept of structural change. With that aim the deterministic and stochastic postulates are introduced in terms of the notion of probability space. These concepts together with the notion of parameter space bring out definitions of stochastic and deterministic structures and structural changes. These elements allow a direct interpretation and measure of economic development in terms of a notion of structural change derived from: (a) an observed structure, (b) the formulation of an objective structure and (c) a given decision model (philosophy of action). (Author)
AD-666 972 HC$3.00 MF$0.65

A NEW APPROACH TO INFLATION THROUGH THE JOINT ANALYSIS OF ECONOMICS EFFICIENCY AND SOCIAL WELFARE - A CASE STUDY: ARGENTINA.
Research paper.
Princeton Univ N J Econometric Research Program
Camilo Dagum. Jan 68, 23p Rept no. RP-19
Contract N00014-67-A-0151, Grant NSF-GS-1840

Descriptors: (*Economics, Argentina), Money, Social sciences, Decision making, Stability, Banking, Budgets, Employment, Government (Foreign).
Identifiers: Inflation (Economics).

The paper points out the main elements under analysis in a study aimed at bringing out the relevant causes of inflation in each kind of economic structure. It stresses the necessity of a direct answer to questions like when, where, why and how an inflationary process is generated as well as its economic, political and social consequences. Further, it points out the necessity of analyzing the nature of inflation and its circumstances rather than contrasting structuralism vs. monetarism. It seeks to specify the cases of inflation, their direction, intensity and interaction in a given type of economic and social structure. With that aim the ideas of economic efficiency and social welfare are introduced and applied to an interpretation of the Argentine case during the last hundred years. (Author)
AD-666 974 HC$3.00 MF$0.65

COMMUNIST CHINA: ECONOMIC TRANSLATIONS NO. 36,
Joint Publications Research Service, Washington, D. C.
Lu Yun. 5 Dec 67, 48p
Trans. of Fei Ch'ing Yen Chiu (Taiwan) v1 n9 p52-7, 96-109 1967.

Descriptors: (*Economics, China), Communism, Industries, Petroleum industry, Industrial plants, Industrial production.
Identifiers: Sugar industry.

Contents: Survey of the Chinese Communist sugar industry; Petroleum industry in Communist China.
JPRS-43561 HC$3.00 MF$0.65

ALBANIA: PRESS INFORMATION REPORT NO. 234.
Joint Publications Research Service, Washington, D. C.
5 Dec 67, 45p

Descriptors: (*Economics, Albania), Professional personnel, Training, Labor, Machine tool industry, Agriculture, Scientific research.

Contents: Economists should receive better training; Training of workers for the machine industry in Tirana City; Progress of scientific research in agriculture; Shortcomings in geological research analyzed.
JPRS-43571 HC$3.00 MF$0.65

USSR INDUSTRIAL DEVELOPMENT: ELECTRONICS AND PRECISION EQUIPMENT NO. 41,
Joint Publications Research Service, Washington, D. C.
V. O. Arutyunov, and B. N. Vorontsov. 6 Dec 67, 21p
Trans. of Izmeritelnaya Tekhnika (USSR) n9 p3-11, 74-6, 1967.

Descriptors: (*Industries, USSR), Electronic equipment, Measuring devices (Electrical + electronic), Quality control.

Contents: The contents and the principal problems of contemporary metrology; To reorganize the work of the Metrological Service.
JPRS-43594 HC$3.00 MF$0.65

EAST EUROPEAN FOREIGN TRADE: TRANSLATIONS NO. 375.
Joint Publications Research Service, Washington, D. C.
12 Dec 67, 16p

Descriptors: (*Commerce, Eastern Europe), Locomotives, Contracts, Industrial prediction, East Germany, Hungary.
Identifiers: Translations.

Contents: East Germany- Soviet diesel locomotives for GDR. Intrabloc- Procedure for concluding contracts for the specialization of production in Hungary within CEMA framework. Hungary- Cooperation with foreign firms on the increase.
JPRS-43689 HC$3.00 MF$0.65

USSR ECONOMY AND INDUSTRY: GENERAL INFORMATION NO. 207.
Joint Publications Research Service, Washington, D. C.
26 Dec 67, 33p

Descriptors: (*Economics, *USSR), Communism, Government (Foreign), Industrial production, Industries, Housing, Education, Scientific personnel, Personnel management, Training.

Contents: Opening up and development of extreme Northeast USSR; Present work and future plans of the new Kazakh economics institute; Raise the level of territorial and branch planning;

Glorious 50-year path from oppression to prosperity in Moldavian SSR; New system of planning and management in RSFSR.
JPRS-43838 HC$3.00 MF$0.65

REPORT ON A SURVEY OF THE U.K. MARKET FOR PRODUCTION EQUIPMENT FOR THE ELECTRONIC INDUSTRY OF THE UNITED STATES.
Windett, Reid Burrows and Bonar Law Ltd., London (England).
Sep 66, 36p

Descriptors: (*Economics, Great Britain), (*Industrial equipment, Great Britain), Machines, Electronic equipment, Commerce, Industries, Production, Wire-winding machines, Predictions, Machine tools, Encapsulation, Industrial procurement.

The British electronic industry is a large and growing one, in which the production of capital goods and components is far larger, and growing faster, than the consumer goods sector. Although we say that this is a large industry, it must be remembered that the American industry is roughly ten times as large:- production in the U.S.A. is four times the combined output of the U.K., West Germany, France and Japan. British production runs tend to be much shorter than American ones, as the market is so much smaller, and consequently there is no requirement for machinery specifically built to handle long runs; such machinery very often is either very expensive, or involves long delays for setting up that make its use on short runs uneconomic. (Author)
PB-176 790 HC$3.00 MF$0.65

NEW DIRECTIONS IN FEDERAL-AID POLICY.
George Washington Univ., Washington, D. C. State and Local Finances Project.
Oct 67, 65p

Descriptors: (*Management planning, Symposia), Economics, Federal budgets, Roads, Rehabilitation, Education, Industrial training, Housing, Urban planning, Rural areas, Medicine, Public health.
Identifiers: National Governors Conference, State budgets, Area planning and development.

The National Governors' Conference meeting in White Sulphur Springs, West Virginia, December 16-17, 1966, adopted seven resolutions with regard to the Federal aid policy and tax sharing.
PB-177 076 HC$3.00 MF$0.65

HIGHWAY SEVERANCE STUDY NUMBER 9, WESTERN KENTUCKY PARKWAY, ELIZABETHTOWN TO LEITCHFIELD, HARDIN COUNTY, GRAYSON COUNTY.
Kentucky Dept. of Highways. Div. of Right of Way.
For primary bibliographic entry see Field 13B.
PB-177 149 HC$3.00 MF$0.65

THE EFFECT OF FREEWAYS ON NEIGHBORHOOD: AN ANALYSIS OF THE RELATIONSHIP OF MOBILITY TO COMMUNITY VALUES.
California State Div. of Highways.
For primary bibliographic entry see Field 13B.
PB-177 343 HC$3.00 MF$0.65

ESSAYS ON APPRENTICESHIP.
Wisconsin Univ., Madison. Center for Studies in Vocational and Technical Education.
For primary bibliographic entry see Field 5I.
PB-177 381 HC$3.00 MF$0.65

OZARKS REGION HIGHWAY PLANNING STUDY.
Preston (E. S.) and Associates Ltd., Columbus, Ohio.
For primary bibliographic entry see Field 13B.
PB-177 574 HC$3.00 MF$0.65

A STUDY OF THE EFFECTS OF FREEWAYS ON CENTRAL BUSINESS DISTRICTS.
Clark Univ., Worcester, Mass. Graduate School of Geography.
For primary bibliographic entry see Field 13B.
PB-177 697 HC$3.00 MF$0.65

STATE AND LOCAL GOVERNMENT ACTIVITIES AND ROLES IN MARINE SCIENCE, ENGINEERING AND DEVELOPMENT. A BRIEFLY ANNOTATED CATALOG OF PUBLISHED STUDIES AND REPORTS ON SUCH ORGANIZATIONAL ARRANGEMENTS AND ACTIVITIES IN THE COASTAL STATES AND IN THOSE BORDERING ON THE GREAT LAKES.
Thompson (John I.) and Co., Washington, D. C.
14 Feb 68, 151p
See also Basic Report, PB-177 765.

Descriptors: (*Natural resources, Bibliographies), Tidewater, Seacoast, Great Lakes, Terrain, Animals, Fishes, Fur, Birds, Shellfish, Management planning, Minerals, Water supplies, Petroleum, Ores (Nonmetallic), Harbors, Beaches, Recreation, Water pollution, Transportation, Erosion, Microbiology, Employment, Public relations, Hawaii, Floods, Soil mechanics.

The bibliography covers state and local administration of facilities and programs for marine activities in states on the seacoasts and bordering the Great Lakes.
PB-177 764 HC$3.00 MF$0.65

A PERSPECTIVE OF REGIONAL AND STATE MARINE ENVIRONMENTAL ACTIVITIES. A QUESTIONNAIRE SURVEY, STATISTICS AND OBSERVATIONS.
Thompson (John I.) and Co., Washington, D. C.
Gilbert L. Maton, Eugene R. Christie, and Morton J. Tenzer. 29 Feb 68, 470p
See also Bibliography, PB-177 764.

Descriptors: (*Natural resources, Management planning), Seacoast, Great Lakes, Terrain, Recreation, Aquatic animals, Minerals, Petroleum, Minerals, Wastes (Sanitary engineering), Water pollution, Harbors, Education, Safety, Protection, Pest control, Energy, Data processing systems, Sampling, Questionnaires.
Identifiers: Territorial surveys, State programs.

The purpose of the report is to present data and information concerning the organization and function of state, local and regional governmental agencies involved in marine environmental activities. The contents include the information and data which were derived from a questionnaire survey of the states and territories. The survey questionnaire sought to identify the state and regional agencies involved in marine environment activities, their authoritative responsibilities, their relationships one to another, and the character and type of their existing and planned activities in or related to the marine environment. The questionnaire survey concentrated on the coastal states and those bordering on the Great Lakes. Inquiry to the twenty inland states was confined to identifying broad state policy and educational criteria only. (Author)
PB-177 765 HC$3.00 MF$0.65

COST OF ROAD ACCIDENTS IN GREAT BRITAIN.
Road Research Lab., Crowthorne (England).
For primary bibliographic entry see Field 13F.
PB-177 779 HC$3.00 MF$0.65

PREMIUM IS STILL EXPECTED.
National Science Foundation, Washington, D. C. Special Foreign Currency Science Information Program.
Kamilo Franic. 1967, 7p SFCSI-Int (TT-67-58027)
Trans. of Morsko Ribarstvo (Yugoslavia) v17 n1/2 p1 1965, tr. by Karmela Vlahovic.

Descriptors: (*Fishes, Economics), (*Industries, Yugoslavia), Economics, Organization, Production, Costs, Employment, Handling, Refrigeration systems, Money.
Identifiers: *Fisheries.

At the beginning of 1964, it was decided to establish what has long been thought to be indispensable - a premium for fish caught. With the collaboration of federal and republic administrative organs an analysis was made of the conditions under which the fish enterprises have run their business during the last five years and the profits of this branch of industry in Yugoslavia.
TT-67-58027 HC$3.00 MF$0.65

5D. History, Law, and Political Science

U.S. ARMY AREA HANDBOOK FOR PANAMA.
American Univ., Washington, D. C. Foreign Area Studies Div.
May 65, 508p
DA-PAM-550-46

Descriptors: (*Handbooks, *Panama), Sociology, Geography, Political science, Rural areas, Urban areas, Economics, Maps, History, Anthropology, Foreign policy, Agriculture, Industries.
Identifiers: Area studies.

This book is one of a series of country handbooks designed for use by persons who have need for such background information. The emphasis is on objective description of contemporary national societies, focusing on basic social, economic and political institutions. Treatment is intended to be comprehensive rather than exhaustive. The studies are introductory, and it is expected that the reader will have recourse to many other sources for more detailed information in areas of special interest. Extensive bibliographies are included for this purpose. (Author)
AD-472 796 HC$3.00 MF$0.65

STUDIES IN DETERRENCE, XIV. CHINESE POLITICAL AND CULTURAL THEMES. A STUDY OF CHINESE COMMUNIST FILMS.
Final rept.,
Mental Research Inst., Palo Alto, Calif.
John H. Weakland. Aug 66, 59p
NOTS-TP-4029
Contract N60530-11070

Descriptors: (*Political science, China), (*Motion picture film, Propaganda), (*Deterrence, China), Communists, Culture, Sociology, History, Education, Social communication, Psychological warfare, Communism, Training, Females, Children, Attitudes, Motivation, Data, Collecting methods.
Identifiers: Literature, Drama, Information media, Antiindividualism, Michelson project.

This is a project Michelson study report. The author analyzes 17 Chinese Communist dramatic films and compares them with traditional Chinese literature and drama and with Chinese films produced in Taiwan and Hong Kong. The dominant themes discussed are: The feudalistic family; Liberation of women; Liberation of youth; Reactionary figures; Revolutionary figures; Antiindividualism; Education and training; Invaders; and National minorities. Emphasis on these is shown to be related to problems of social conflict, communication, and authority within the Chinese culture. (Author)
AD-489 371 HC$3.00 MF$0.65

CONTEMPORARY IRAQ REFERENCE BOOK.
Department of the Navy Washington D C
13 Feb 68, 174p Rept no. J-3847
Trans. of mono. Sovremennyi Irak (Spravochnik), Moscow, 1966.

Descriptors: (*Political science, Iraq), (*Economics, Iraq), Handbooks, Population, Economics,

History, Government (Foreign), Organizations, Culture, USSR, Public health, Industries, Foreign policy.
Identifiers: Translations, Area studies.

Contents: Country and population; Economic structure; Historical sketch; Government system and public organizations; Culture.
AD-666 728 HC$3.00 MF$0.65

CHALLENGE AND RESPONSE IN INTERNAL CONFLICT. VOLUME I. THE EXPERIENCE IN ASIA,
American Univ Washington D C Center for Research in Social Systems
For primary bibliographic entry see Field 15G.
AD-666 747 HC$3.00 MF$0.65

COMMUNIST CHINA'S MILITARY DOCTRINES.
Research Analysis Corp Mclean Va
For primary bibliographic entry see Field 15G.
AD-666 784 HC$3.00 MF$0.65

STRATEGIC PROJECTIONS AND POLICY OPTIONS IN THE SOVIET-CUBAN RELATIONSHIP,
Center for Naval Analyses Washington D C Inst of Naval Studies
D. P. Wilson. 11 Mar 68, 20p Rept no. INS-Research Contrib-24
Contract N00014-68-A-0091

Descriptors: (*Political science, Cuba), (*Foreign policy, USSR), Communism, Economics, Foreign aid, Decision making, Vulnerability, Military strategy, Commerce.
Identifiers: *International relations.

The paper projects the Soviet-Cuban relationship by: (1) citing 3 factors which structure it; (2) combining Soviet foreign policy alternatives with Soviet intentions either to retain or to withdraw from Cuba to form a matrix with 4 outcomes; and (3) analyzing each outcome for policy inferences and Soviet problems which have implications for the United States. (Author)
AD-666 819 HC$3.00 MF$0.65

BOMBING NORTH VIETNAM: AN APPRAISAL OF ECONOMIC AND POLITICAL EFFECTS,
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 15G.
AD-666 957 HC$3.00 MF$0.65

POLITICAL TRANSLATIONS ON EASTERN EUROPE NO. 310,
Joint Publications Research Service, Washington, D. C.
Heinz Hoffmann. 6 Dec 67, 32p
Speech by Defense Minister Hoffman at Scientific Conference of Military Academy. Trans. of Voksarmee (East Germany) supl6 p3-12 1967.

Descriptors: (*Political science, *Eastern Europe), History, Communism, Leadership, USSR, Foreign policy, Cold war, East Germany.
JPRS-43591 HC$3.00 MF$0.65

NEAR EAST: TRANSLATIONS NO. 230.
Joint Publications Research Service, Washington, D. C.
6 Dec 67, 35p
UAR Administration of The Gaza Strip. Trans. of mono. Qita' Ghazzah, Cairo, n.d., p3, 7-8, 11-35, 50-52, 58-61, 67-74.

Descriptors: (*Political science, *Middle East), Leadership, Government (Foreign), Education, Urban areas, Rural areas, Economics, Culture, Public health, Industries, Organizations, Egypt.

Contents: What is the Gaza Strip; Arab administration in the Gaza Strip- Department of Finance and Economy; Department of Urban and Rural Affairs; Education and culture; Health; Camps Department; War Veterans' Association; Palestinian Liberation Organization; Agricultural and Cooperative Loan Bank; Palestinian Chamber of Commerce; Industry; Assistance of the UAR to the Gaza Strip.
JPRS-43600 HC$3.00 MF$0.65

NEAR EAST: TRANSLATIONS NO. 232.
Joint Publications Research Service, Washington, D. C.
11 Dec 67, 69p

Descriptors: (*Political science, *Middle East), National defense, Law, Foreign policy, Armed forces (Foreign), Government (Foreign), Attitudes, Agriculture, Economics, Police, Greece, Israel, Egypt.
Identifiers: Translations.

Contents: Greece- More data revealed from the EDA archives; Essential services for civil defense purposes defined by law. Israel- Extension of West German influence in the Middle East decried; A call for the curtailment of ties with West Germany; Homage to the heroes of the Israeli Army; Water pipe systems in residential homes; Conditions in Gaza under Israel occupation; Discrimination against the Arabs in Israel. UAR- Exodus and political organization.
JPRS-43656 HC$3.00 MF$0.65

TEN YEARS OF SPACE RESEARCH IN THE USSR.
National Aeronautics and Space Administration, Washington, D. C.
For primary bibliographic entry see Field 22A.
For abstract, see STAR 06 09.
N68-19198 HC$3.00 MF$0.65

HISTORIC AMERICAN BUILDINGS SURVEY. CATALOG OF THE MEASURED DRAWINGS AND PHOTOGRAPHS OF THE SURVEY IN THE LIBRARY OF CONGRESS, COMPRISING ADDITIONS SINCE MARCH 1, 1941.
National Park Service, Washington, D. C.
For primary bibliographic entry see Field 13M.
PB-177 633 HC$3.00 MF$0.65

INTERNATIONAL LEGAL PROBLEMS OF SCIENTIFIC RESEARCH IN THE OCEANS,
Ohio State Univ., Columbus. Coll. of Engineering.
William T. Burke. Aug 67, 146p

Descriptors: (*Oceanology, International law), Reports, Markers, Buoys, Continental shelves, Seas, Navigational aids, Oceans, Marker lights, Ocean surveillance, Underwater vehicles, Deep submergence, Communication systems.
Identifiers: Continental shelf.

The purpose of this study is to examine international legal problems . ctually or potentially involved in the conduct of scientific exploration and investigation of the marine environment and its resources, including the use of vessels, marine objects and structures for such purposes. Initially it is desirable (A) to specify the kind of activity subsumed under the rather broad term 'scientific exploration and investigation' in this context; (B) to attempt to place the legal framework for research in the context of the global requirements of such research; and (C) to comment upon the structure or organization of the study. (Author)
PB-177 724 HC$3.00 MF$0.65

LAW FOR THE SEA'S MINERAL RESOURCES,
National Council on Marine Resources and Engineering Development, Washington, D. C.
Louis Henkin. Dec 67, 195p

Descriptors: (*Law, Oceans), Continental shelves, Deep water, International law, Operation, Exploration, Deposits, Petroleum, United States, Minerals, United States government, United Nations, Government (Foreign).
Identifiers: Continental shelf, Mineral resources (Marine).

In this memorandum, the law that governs the extraction of mineral resources from the bed of the seas is considered; its advantages and disadvantages for the United States; and the advantages and disadvantages of various new legal arrangements that might be adopted instead. The report does not deal with other uses of the sea, or with the law governing them, except glancingly, as these might relate to my principal concern. (Author)
PB-177 725 HC$3.00 MF$0.65

BASIC SEA FISHERIES LAW.
National Science Foundation, Washington, D. C. Special Foreign Currency Science Information Program.
1968, 17p SFCSI-Int (TT-67-58029)
Trans. of Sluzbeni List SFRJ, Belgrade (Yugoslavia) v21 n10 p281-6 1965, tr. by Branislav Romcevic.

Descriptors: (*Law, *Fishes), International law, Protection, Commerce, Production, Supervision, Yugoslavia.
Identifiers: *Fisheries.

The proclamation consists of the Basic Sea Fisheries Law of Yugoslavia. Included are the general provisions, the provisions on sea fishing, the provisions on raising fish, raising and catching sea animals, and measures for improving sea fisheries, the provisions on the protection sea fisheries, the provisions on enforcement, on punitive sanctions and also 'Transitional and concluding provisions'.
TT-67-58029 HC$3.00 MF$0.65

5E. Human Factors Engineering

TECHNOLOGICAL REQUIREMENTS COMMON TO MANNED PLANETARY MISSIONS. APPENDIX D - SYSTEM SYNTHESIS AND PARAMETRIC ANALYSIS FINAL REPORT.
North American Rockwell Corp., Downey, Calif. Space Div.
For primary bibliographic entry see Field 22A.
For abstract, see STAR 06 09.
N68-19223 HC$3.00 MF$0.65

STUDY FOR THE COLLECTION OF HUMAN ENGINEERING DATA FOR MAINTENANCE AND REPAIR OF ADVANCED SPACE SYSTEMS. VOLUME 1 - SUMMARY TECHNICAL REPORT FINAL STUDY REPORT, 26 AUG. 1966 - 31 DEC. 1967.
General Electric Co., Philadelphia, Pa. Missile and Space Div.
31 Dec 67, 112p NASA-CR-61650, DOC.-67SD4441, V. 1
Contract NAS8-18117

Descriptors: *Experimental design, *Human factors engineering, *Space maintenance, Astronaut performance, Data reduction, Space environment simulation, Systems engineering, Test facilities, Weightlessness.

For abstract, see STAR 06 09.
N68-19296 HC$3.00 MF$0.65

STUDY FOR THE COLLECTION OF HUMAN ENGINEERING DATA FOR MAINTENANCE AND REPAIR OF ADVANCED SPACE SYSTEMS. VOLUME 2 - DETAILED TECHNICAL REPORT FINAL STUDY REPORT.
General Electric Co., Philadelphia, Pa. Missile and Space Div.
31 Dec 67, 428p NASA-CR-61649, DOC.-67SD4441, V. 2
Contract NAS8-18117

Descriptors: *Buoyancy, *Space maintenance, *Weightlessness simulation, Data processing, Data reduction, Equations of motion, Extravehicular activity, Human factors engineering, Research facilities, Submerging, Test equipment.

For abstract, see STAR 06 09.
N68-19493 HC$3.00 MF$0.65

AN ATTEMPT TO MEASURE OBJECTIVELY THE QUALITY OF AIR.
National Swedish Inst. for Building Research, Stockholm (Sweden).
For primary bibliographic entry see Field 13B.
PB-177 763 HC$3.00 MF$0.65

5F. Humanities

A BRIEF SURVEY OF THE LOWER COLORADO RIVER FROM DAVIS DAM TO THE INTERNATIONAL BORDER.
National Park Service, Sante Fe, N. Mex. Region Three Office.
Albert H. Schroeder. Dec 52, 99p

Descriptors: (*Archaeology, Arizona), History, Ceramic materials, Site selection, Culture, Utensils (Food), Small tools, Pictures, California.
Identifiers: Lower Colorado River, Gila River, Pottery.

The survey covered the lower Colorado River and the lower Gila River along the California-Arizona line between Nevada and Mexico. Sixty-six sites were recorded, many of which were small camps or represented trail breakage. Several aboriginal trails ran through this area and sites tended to cluster along these. Petroglyphs, shrines, rock shelters and rock alignments were also recorded although architectural features were absent. A large section of the report is devoted to a description of pottery types recovered. All are considered as one ware and are divided into six series; Palo Verde, Parker, La Paz, Gila Bend, Salton, and Lower Gila. A short section on the movements of peoples as reflected in the pottery types and a reexamination of earlier work rounds out the report. (Author)
PB-177 095 HC$3.00 MF$0.65

HISTORIC AMERICAN BUILDINGS SURVEY.
National Park Service, Washington, D. C. Historic American Buildings Survey.
For primary bibliographic entry see Field 13M.
PB-177 632 HC$3.00 MF$0.65

5G. Linguistics

ON THE ELIMINATION OF ENDMARKERS,
System Development Corp Santa Monica Calif
Seymour Ginsburg, and Michael A. Harrison. 24 Oct 67, 23p Rept nos. Scientific-13, TM-738/040/00
AFCRL-67-0666
Contract F19628-67-C-0008, Grant AF-AFOSR-1203-67
See also Scientific Report no. 9, AD-661 970.

Descriptors: (*Artificial intelligence, Automata), (*Language, Theory), Information theory, Set theory, Symbols, Theorems.
Identifiers: Automata theory.

It is proven that one endmarker can be eliminated from a stack acceptor without affecting recognition power. It is also noted that both endmarkers can be eliminated from deterministic linear bounded acceptors. (Author)
AD-666 922 HC$3.00 MF$0.65

RESEARCH ON MACHINE AIDS TO AN EDITOR OF SCIENTIFIC TRANSLATIONS.
American Mathematical Society, Providence, R.I.
Feb 68, 79p Rept. no. 1
Grant NSF-GN-644

Descriptors: (*Machine translation, Chinese language), Character recognition, Scientific research, Linguistics, Information retrieval, Dictionaries, Coding, Graphics, Programming (Computers).
Identifiers: Editors (Translations).

The report describes progress to date on the American Mathematical Society's project on machine aids to an editor of scientific translations. The structure of the project is basically tripartite: the graphical input/output system for handling Chinese characters in their natural form, the development of methods for computer manipulation of Chinese text and dictionary materials, and the supporting functions, clerical and administrative, which are necessary to support production and provide direction to the project as a whole. The graphical system is being developed at Harvard University. (Author)
PB-177 775 HC$3.00 MF$0.65

5H. Man-Machine Relations

STEREO TV ENHANCEMENT STUDY FINAL TECHNICAL REPORT.
Kollsman Instrument Corp., Syosset, N. Y. Electro-optics Div.
G. Cupit, and E. Hudson. Feb 68, 10p NASA-CR-61594
Contract NAS8-21201

Descriptors: *Extraterrestrial environments, *Signal to noise ratios, *Stereotelevision, *Target acquisition, Calibrating, Errors, Remote control, Stereophotography, Tests.

For abstract, see STAR 06 09.
N68-18903 HC$3.00 MF$0.65

STEREO TV ENHANCEMENT STUDY FINAL TECHNICAL REPORT.
Kollsman Instrument Corp., Syosset, N. Y. Electro-optics Div.
G. Cupit, and E. Hudson. Feb 68, 108p NASA-CR-61630
Contract NAS8-21201

Descriptors: *Human factors engineering, *Sensory perception, *Stereoscopic vision, *Television transmission, *Visual acuity, Human performance, Space perception, Visual discrimination.

For abstract, see STAR 06 09.
N68-19145 HC$3.00 MF$0.65

A DESCRIPTIVE MODEL FOR DETERMINING OPTIMAL HUMAN PERFORMANCE IN SYSTEMS. VOLUME 3 - AN APPROACH FOR DETERMINING THE OPTIMAL ROLE OF MAN AND ALLOCATION OF FUNCTIONS IN AN AEROSPACE SYSTEM.
Serendipity Associates, Chatsworth, Calif.
H. E. Price, and B. J. Tabachnick. Mar 68, 1204p NASA-CR-878
Contract NAS2-2955
Coll- 1204 P Refs

Descriptors: *Aerospace systems, *Human performance, *Man machine systems, Automation, Dynamic models, Human factors engineering, Optimization, Remote control.

For abstract, see STAR 06 09.
N68-19165 HC$3.00 MF$0.65

5I. Personnel Selection, Training, and Evaluation

A REVIEW OF RECENT RESEARCH AND DEVELOPMENT ON MILITARY LEADERSHIP, COMMAND, AND TEAM FUNCTION.
Research memo.,
George Washington Univ., Alexandria, Va. Human Resources Research Office.
Meredith P. Crawford. 7 Sep 64, 27p
Contract DA-44-188-ARO-2
Presented at the Annual Convention of The American Psychological Association 1964.

Descriptors: (*Military training, *Symposia), (*Military psychology, Military training), Job analysis, Human engineering, Performance (Human), Attitudes, Motivation, Learning, Leadership, Teaching methods, State-of-the-art reviews, Officer personnel, Military personnel, Feasibility studies, Military organizations, Group dynamics.

A review of recent research and development on military leadership, command, and team function.
AD-478 288 HC$3.00 MF$0.65

RIFLEMAN II. AN ADVANCING SMALL ARMS TARGET.
Research memo.,
George Washington Univ., Alexandria, Va. Human Resources Research Office.
Howard C. Sarvis. Mar 59, 29p

Descriptors: (*Training devices, Targets), Design, Small arms, Effectiveness, Performance (Human), Military personnel.

An approaching small arms target was developed to rapidly and realistically express the changes in shape, size and position of a target in close combat. In addition to the specific training problems for which it is designed, it appears that a variety of training exercises could be based on this target, not only for initial training but for maintenance of skill in remote places where informal means must be improvised. The device is being released before it has been used extensively in the hope of stimulating thinking about its employment in other problems for which it might be suited. (Author)
AD-478 298 HC$3.00 MF$0.65

A DYNAMIC MODEL OF URBAN STRUCTURE,
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 5C.
AD-666 655 HC$3.00 MF$0.65

ADULT EDUCATION GOALS FOR LOS ANGELES: A WORKING PAPER FOR THE LOS ANGELES GOALS PROGRAM,
Rand Corp Santa Monica Calif
H. S. Dordick. Mar 68, 18p Rept no. P-3808

Descriptors: (*Education, Adults), Employment, Universities, Statistical data, Instructors, Students, Teaching methods, Urban areas, California.
Identifiers: Los Angeles (California).

The paper is concerned with adult education in the Los Angeles area. Future needs for specialized educational services that fall outside the formal educational structure of the state are discussed. The report is also concerned with continuing education for the professional man or woman, with continuing educational and intellectual challenge for the housewife or retired person, for the nonprofessional and for the professional who wants to learn about other professions. The discussion considers the needs of the unskilled laborer who has the desire and the ability to find and learn a skill; the man whose skills are no longer economically valuable and who seeks a new set of skills; the curious who want to learn as a hobby. It considers also the high school dropout who wants to complete his education, the university dropout who now finds it timely and appropriate to complete his work, and the immigrant who seeks citizenship and eventual employment. (Author)
AD-666 657 HC$3.00 MF$0.65

CLINICAL INVESTIGATIONS OF STUTTERING. I. ADJUSTMENT AND EFFECTIVENESS OF STUTTERERS IN MILITARY SERVICE.
Walter Reed Army Medical Center Washington D C Audiology and Speech Center

For primary bibliographic entry see Field 5J.
AD-666 782 HC$3.00 MF$0.65

AN ANALYSIS OF THE M48 TROOP TEST FIRING DATA.
George Washington Univ Alexandria Va Human Resources Research Office
For primary bibliographic entry see Field 19C.
AD-666 808 HC$3.00 MF$0.65

EVALUATION OF SUPPLY CORPS FLEET TRAINING MATERIALS.
Research memo.,
Naval Personnel Research Activity San Diego Calif Navy Training Research Lab
Adolph V. Anderson. Jul 67, 16p
NPRA-SRM-68-4

Descriptors: (*Naval training, Programmed instruction), Handbooks, Instruction manuals, Analysis, Effectiveness, Procurement, Logistics, Questionnaires, Response, Tables.

The purpose of the research is to determine the effectiveness and fleet acceptance of a set of commissaryman lesson plans and a set of military requirements lesson plans for use in shipboard training programs. (Author)
AD-666 826 HC$3.00 MF$0.65

ATTITUDES OF PSYCHOLOGISTS TOWARD THEIR JOBS.
Technical rept.,
Texas Christian Univ Fort Worth Inst of Behavioral Research
S. B. Sells, and Donald P. Will, Jr. Sep 66, 14p
Rept no. TR-12
Contract Nonr-3436 (00)
Supersedes AD-642 580.

Descriptors: (*Professional personnel, Attitudes), Military psychology, Recruiting, Questionnaires, Statistical data, Civilian personnel, Wages, Military personnel.

A comparison of the attitudes of sampled Civilian, Federal Civil Service, and Uniformed Services psychologists (taking into account education, experience, annual salary, annual income, seniority, and APA participation) toward their work and conditions of employment is presented. (Author)
AD-666 854 HC$3.00 MF$0.65

STUDY AND DEVELOPMENT OF A SIMULATION INFINITE DEPTH OF FIELD OPTICAL PICKUP.
Goodyear Aerospace Corp Akron Ohio
For primary bibliographic entry see Field 20F.
AD-666 939 HC$3.00 MF$0.65

A STANDARDIZED TASK FORMAT FOR PERSONNEL REQUIREMENTS INFORMATION SYSTEM METHODOLOGY (PRISM).
Preliminary rept.,
Naval Personnel Research Activity San Diego Calif
Gordon M. Campbell. Mar 68, 44p Rept no.
NPRA-SRM-68-17

Descriptors: (*Personnel management, Data processing systems), Naval personnel, Human engineering, Man-machine systems, Military requirements, Job analysis, Information retrieval, Manpower.
Identifiers: *Personnel requirements information system methodology.

The report documents the development of a standardized task format designed to include all of the detailed information necessary for the development, analysis, and utilization of complete Navy personnel manning and training requirements information. An information structure developed at the Aerospace Medical Research Laboratories (AMRL) was utilized as a focal point for this phase of research. The AMRL task format was modified to make it more responsive to Navy requirements. (Author)
AD-666 978 HC$3.00 MF$0.65

A FIELD SURVEY OF ELECTRONIC MAINTENANCE TECHNICAL DATA.
Final rept. Apr 66-Apr 67,
Applied Science Associates Inc Valencia Pa
John D. Folley, Jr., and Thomas K. Elliott. Nov 67, 44p
AMRL-TR-67-159
Contract AF 33 (615)-3966

Descriptors: (*Military facilities, Maintenance), (*Electronic technicians, Performance (Human)), Training devices, Job analysis, Limited war, Counterinsurgency, Microminiaturization (Electronics), Modules (Electronics), Surveying, Test methods, Malfunctions, Communication systems, Cryogenics, Optimization, Defects (Materials).
Identifiers: Interviews, Performance aids, Avionics.

A survey, using interview and observation, was made in five subject areas to determine current and anticipated problems associated with development and use of performance aids in the Air Force, and to identify implications of those problems for relevant research. The five areas surveyed are: job-task content and current performance aids for electronic technicians at typical Air Force sites, unique problems of performance aids in limited war operations, current requirements for optimum performance aids, the nature of future electronic technology as it may affect performance aids, and current and future developments in performance aids technology. Visits were made to 12 different Air Force bases, nine equipment development firms and laboratories, one commercial airline maintenance facility, one commercial communications firm, and conversations with ten researchers working in technical data and job performance. About 800 man-hours were spent in collecting information. (Author)
AD-666 990 HC$3.00 MF$0.65

ALBANIA: PRESS INFORMATION REPORT NO. 234.
Joint Publications Research Service, Washington, D. C.
For primary bibliographic entry see Field 5C.
JPRS-43571 HC$3.00 MF$0.65

USSR LABOR: TRANSLATIONS NO. 220.
Joint Publications Research Service, Washington, D. C.
5 Jan 68, 21p

Descriptors: (*Labor, *USSR), Retraining, Training, Scientific personal, Supervision, Education, Communism, Leadership, Government (Foreign), Agriculture.

Contents: Re-training and re-distribution of workers; Underestimation of scientific organization of labor in Kazakh agriculture; Benefits to rural Lithuania since Soviet rule and need for more progress.
JPRS-43883 HC$3.00 MF$0.65

COLLEGE, COLOR, AND EMPLOYMENT. RACIAL DIFFERENTIALS IN POSTGRADUATE EMPLOYMENT AMONG 1964 GRADUATES OF LOUISIANA COLLEGES,
National Opinion Research Center, Chicago, Ill.
Carolyn F. Huson, and Michael E. Schiltz. Jul 66, 152p Rept. no. 116
Grant DL-91-15-66-01

Descriptors: (*Students, *Manpower studies), (*Employment, Louisiana), Universities, Inequalities, Classification, Distribution, Sex, Wages, Money, Decision making, Job analysis, Questionnaires, Tables.
Identifiers: Ethnic groups, Post graduate employment.

The analysis of Negro-white employment differentials among 1964 graduates of colleges in Louisiana is the product of a cooperative venture involving the National Opinion Research Center, the U.S. Department of Labor, and the administrations of four predominantly Negro colleges. The questionnaire which forms the basis for this report was designed by the representatives of Dillard University, Grambling College, Southern University and A. and M. College, and Xavier University--all institutions predominantly serving Negro students in Louisiana. In the summer of 1965 each of the four institutions administered the questionnaire separately to its own graduates of the class of 1964 and processed the data they obtained. NORC simultaneously administered an identical questionnaire to the 1964 May-June graduates of three predominantly white institutions in Louisiana who had responded to an earlier NORC survey of college graduates. The U.S. Department of Labor provided overall coordination and financial support for the projects. (Author)
PB-177 324 HC$3.00 MF$0.65

ESSAYS ON APPRENTICESHIP,
Wisconsin Univ., Madison. Center for Studies in Vocational and Technical Education.
Norman F. Dufty. 1967, 176p

Descriptors: (*Industrial training, Manpower studies), Construction, Organizations, Labor unions, Recruiting, Labor, Assembling, Wisconsin, Reports, Control, Reviews, Mathematical models, Job analysis, Commerce, Education, Australia, Statistical analysis.
Identifiers: Apprenticeship.

Contents: Apprenticeship: An evaluation of the need; Union interests in apprenticeship and other training forms; A survey of Wisconsin building trades joint apprenticeship committees; The structure of related instruction in Wisconsin apprenticeship programs; Apprenticeship - a theoretical model; Recruitment to the skilled trades: A study of a segment of a skilled labor market; A model of choice in labor markets.
PB-177 381 HC$3.00 MF$0.65

AN EVALUATION OF THE COMMUNITY EDUCATION DEMONSTRATION PROJECTS.
Data Systems Research, Inc., New York.
For primary bibliographic entry see Field 5A.
PB-177 678 HC$3.00 MF$0.65

MATHEMATICAL MODELS FOR EDUCATIONAL PLANNING.
Professional paper,
System Development Corp., Santa Monica, Calif.
Zivia S. Wurtele. 30 Nov 67, 32p SP-3015

Descriptors: (*Education, *Mathematical models), Programming (Computers), Teaching methods, Management planning, Flow charting, Classification, Sociometrics, Group dynamics, Predictions, Statistical analysis.
Identifiers: Computer analysis, Cost-benefit models.

The utilization of computer programmed mathematical models for educational planning has a brief but rapidly accelerating history. This paper describes and to some extent evaluates, several of these models. It also discusses some of the theoretical problems associated with their formulation and implementation. Models surveyed are of: (1) the educational system or some of its components, and (2) the economy, in which education is one of several interrelated activities. The final chapter contains some general remarks on the role of mathematical models as tools for educational planning. (Author)
PB-177 729 HC$3.00 MF$0.65

THE PUBLIC'S SHARE IN SHAPING EDUCATIONAL POLICY: A PILOT STUDY.
Professional paper.
System Development Corp., Santa Monica, Calif.
Thorington B. Robertson. 12 Dec 67, 40p SP-3022

Descriptors: (*Education, Management planning), (*Management planning, Public opinion), Public relations, Group dynamics, Teaching methods, Attitudes, Decision making, Collecting methods, Analysis, Symposia, Research program administration, Statistical analysis, California, New York.
Identifiers: Pilot studies, Bootstrap operation, Los Angeles (California), Santa Monica (California), New York City.

This paper discusses a pilot study being conducted by the SDC Educational Policy Research and Support Center designed to (a) experiment with methods for ascertaining educational wants, (b) ascertain what a selected number of groups want from future educational programs, (c) examine the extent to which these groups agree or disagree with respect to educational wants, and (d) expose potential issues raised by these wants. The paper discusses the conduct of the study and the outcomes of meetings held in Los Angeles, Santa Monica, and New York. It presents tentative findings concerning methods, group wants, and educational issues. (Author)
PB-177 731 HC$3.00 MF$0.65

AN ACTION RESEARCH STUDY FOR THE UTILIZATION OF AN AUTOMATED INSTRUCTIONAL SYSTEM WITH JOB CORPSMEN.
Final rept., 5 Jan-15 May 66,
United States Industries, Inc., Silver Spring, Md. Educational Science Div.
Richard E. Walther, Isadore Goldberg, Norman E. Stander, and C. Glenn Davis. 15 May 66, 80p
Contract OEO-919

Descriptors: (*Education, Teaching machines), Training devices, Teaching methods, Education, Tests, Statistical analysis, Effectiveness, Efficiency, Attitudes, Automation, Instructors, Group dynamics, Man-machine systems, Training, Correlation techniques.
Identifiers: Job corps, AutoTutors.

The study was concerned with a demonstration of the applicability of an automated instructional system, the AutoTutor teaching machine and branching programs, to the Job Corps population. Courses in mathematics and communications skills were presented to Job Corpsmen deficient in these areas. An experiment was conducted to study learning effectiveness, study time, efficiency, and student attitudes under various instructional conditions. Implications were drawn for the utilization of the instructional system in an individualized program. (Author)
PB-177 742 HC$3.00 MF$0.65

THE SCOPE OF INDUSTRIAL TRAINING IN SELECTED SKILLED AND TECHNICAL OCCUPATIONS.
Stanford Research Inst., Menlo Park, Calif.
Harry V. Kincaid. Oct 66, 80p SRI-1-4846
Contract MDTA-12-64

Descriptors: (*Industries, *Manpower studies), (*Industrial training, Questionnaires), Research program administration, Employment, Industrial plants, Electrical equipment, Maintenance personnel, Dies, Small tools, Electronic technicians, Material forming, Welding, Statistical data, Programmed instruction, Budgets, Correlation techniques, Time studies.
Identifiers: Apprentices, Millwrights, Welders.

Training of the industrial work force ranges from formal classes in public and private schools through lengthy apprenticeship to informal on-the-job training. The role of United States industry in this training effort is important, but the ways in which it is important have been more matters of speculation than of systematic study. Much more needs to be known about the amount and type of training conducted by industry before reasonable policy decisions can be made concerning the overall problems of industrial training for the nation. A mail questionnaire survey was conducted of employment, formal training, and apprenticeship practices within the metalworking industry of six technical occupations: maintenance electrician, tool and die maker, electronic technician, maintenance mechanic, millwright, and welder. 2,400 Metalworking plants in the United States with 500 or more employees were surveyed. Since this study covers only six occupations and a small segment of United States industry, the results cannot be generalized either to all industry or to all training for the specified occupations. However, the metalworking industry does provide a significant amount of employment in most of the occupations studied. (Author)
PB-177 7?2 HC$3.00 MF$0.65

5J. Psychology (Individual and Group Behavior)

THE EFFECT OF TREADMILL GRADE ON PERFORMANCE DECREMENT USING A TITRATION SCHEDULE.
Army Medical Research Lab., Fort Knox, Ky.
Wayne O. Evans. 9 Apr 62, 17p USAMRL-535
Report on Psychophysiological Studies.

Descriptors: (*Psychomotor tests, Exercise), Fatigue (physiology), Legs, Measurement, Motor reactions, Performance (human).

This investigation is a methodological study of the effect of an independent variable of work with prima facie validity on the performance decrement of subjects walking at a submaximal rate on a treadmill, the velocity of which is controlled by the subject on a titration schedule. Indices of performance were derived from a best estimate of linear fit for the data. The slope constant, the ordinal intercept, the total walking time, and the 'tracking behavior' were considered for correlation, individual variance, and variation with changes in the grade of the treadmill. Changes in the grade of the treadmill were shown to produce the expected changes in intercept and total walking time.
AD-275 974 HC$3.00

VIGILANCE PERFORMANCE AS A FUNCTION OF TASK AND ENVIRONMENTAL VARIABLES.
Research rept.,
George Washington Univ., Alexandria, Va. Human Resources Research Office.
Bruce O. Bergum, and Donald J. Lehr. May 63, 37p RR-11
Contract DA-44-188-ARO-2

Descriptors: (*Psychometrics, Attention), Monitors, Test methods, Visual signals, Group dynamics, Response, Learning, Performance (Human), Motivation, Supervision, Auditory signals, Permutations, Radar tracking, Job analysis, Environment.

Fourteen experiments were conducted to compare the effects on vigilance of paired and individual monitoring, high and low signal rates, rest periods versus continuous monitoring, knowledge of pretest performance, partial and complete knowledge of results of monitoring, monetary incentives, knowledge of vigil length, supervision by an officer, and false visual and auditory signals. Some of the experiments combined two or more of these variables; a final study compared four combinations of the three most effective variables. The three most effective variables were determined to be multiple monitoring, monitoring with spaced rest periods, and supervised monitoring. In general, the data tended strongly to support a motivational interpretation of vigilance. In simple tasks, learning appears to be a trivial factor at best in the maintenance of detection performance. The results for the optimization study suggest that significantly high levels of performance can be maintained over fairly extended time periods, with careful selection of conditions. (Author)
AD-404 212 HC$3.00

SOCIAL ACTION IN CIVIL DEFENSE. THE STRATEGY OF PUBLIC INVOLVEMENT IN A COUNTY CIVIL DEFENSE EDUCATIONAL PROGRAM.
Iowa Agricultural and Home Economics Experiment Station, Ames.
For primary bibliographic entry see Field 15C.
AD-451 079 HC$3.00

A REVIEW OF RECENT RESEARCH AND DEVELOPMENT ON MILITARY LEADERSHIP, COMMAND, AND TEAM FUNCTION.
George Washington Univ., Alexandria, Va. Human Resources Research Office.
For primary bibliographic entry see Field 5I.
AD-478 288 HC$3.00 MF$0.65

RESEARCH ON HUMAN AERIAL OBSERVATION. PART I. SUMMARY.
Research memo.,
George Washington Univ., Alexandria, Va. Human Resources Research Office.
John A. Whittenburg, Alvin L. Schreiber, John P. Robinson, and Peter G. Nordlie. Jul 60, 39p
Prepared in cooperation with Human Sciences Research, Inc., McLean, Va. See also Part 3, AD-452 708.

Descriptors: (*Aerial reconnaissance, *Performance (Human)), (*Target recognition, Effectiveness), Detection, Vision, Targets, Identification, Visibility, Job analysis, Army personnel, Climatology, High altitude, Surface targets, Aviation personnel.
Identifiers: Long arm.

Contents: Rationale and procedures--guiding assumptions and research decisions; Major phases of the research effort; Additional activities; Future requirements and present capabilities for aerial observation--requirements for future aerial observation; Aerial observer capabilities; Discussion of aerial observation problems and possible solutions--target detection; Target identification; Target locations, System response time.
AD-479 196 HC$3.00 MF$0.65

STUDIES IN DETERRENCE, XIV. CHINESE POLITICAL AND CULTURAL THEMES. A STUDY OF CHINESE COMMUNIST FILMS.
Mental Research Inst., Palo Alto, Calif.
For primary bibliographic entry see Field 5D.
AD-489 371 HC$3.00 MF$0.65

REVERSAL LEARNING AS A FUNCTION OF THE SIZE OF THE REWARD DURING ACQUISITION AND REVERSAL.
California Univ Santa Barbara
Howard H. Kendler, and Joseph Kimm. 1967, 6p
Contract Nonr-4222 (04)
Availability: Published in Journal of Experimental Psychology, v73 n1 p66-71 1967.

Descriptors: (*Learning, Motivation), Conditioned reflex, Behavior, Rats, Experimental design, Analysis of variance.
Identifiers: Reinforcement (Psychology), *Reversal learning.

80 rats were used in a 2x2x2x2 experimental design involving learning to a criterion and overlearning, a differentiated and undifferentiated T maze, small and large food reward during initial learning, and small and large food reward during reversal learning. The results indicated that a large, as compared to a small, reward during initial as well as during reversal learning facilitated reversal learn-

ing. An analysis of the perseyerative errors revealed that Ss with a large reward during initial learning made fewer perseverative errors. An interaction between the size of the reward during initial learning and overlearning exerted significant effects on perseverative errors; overlearning produced greater resistance to extinction of the initial habit of Ss with small as compared to large rewards. (Author)
AD-666 628 Not available from CFSTI.

SELECTIVE ATTENTION VERSUS MEDIATION: SOME COMMENTS ON MACKINTOSH'S ANALYSIS OF TWO-STAGE MODELS OF DISCRIMINATION LEARNING,
California Univ Santa Barbara
Howard H. Kendler, and Tracy S. Kendler. 1966, 7p
Contract Nonr-4222 (04), Grant NSF-GB-1447
Availability: Published in Psychological Bulletin, v66 n4 p282-8 1966.

Descriptors: (*Learning, Motivation), Attention, Verbal behavior, Stimulation, Conditioned reflex, Reaction (Psychology).
Identifiers: Reversal learning.

The similarities and differences between selective attention and mediational S-R formulations are discussed particularly in relation to the meanings of the two concepts and to the role of verbal processes in the rapid reversals exhibited by older children and human adults. It is concluded that both formulations require further conceptual articulation. (Author)
AD-666 630 Not available from CFSTI.

REVERSAL AND PARTIAL REVERSAL SHIFTS WITH VERBAL MATERIAL.
California Univ Santa Barbara
Howard H. Kendler, Tracy S. Kendler, and Joyce Sanders. 10 May 65, 11p
Contract Nonr-4222 (04)
Availability: Published in Journal of Verbal Learning and Verbal Behavior, v6 p117-27 1967.

Descriptors: (*Learning, Motivation), Verbal behavior, Stimulation, Reaction (Psychology), Recall, Analysis of variance, Conditioned reflex.
Identifiers: Reversal learning.

A series of four studies was conducted to investigate the influence of mediating representational responses on reversal and partial-reversal shifts involving verbal material. The general assumption tested was that the speed with which a reversal shift is executed depends on the accessibility of appropriate mediating representational responses. In Exp. I Ss were required initially to sort eight items into two categories and then during post-shift training to either switch the sorting response for every item (reversal shift) or for only half of the items in each category (half-reversal shift). Two kinds of verbal items were used: eight words, each one of which was an instance of one of two concepts, and eight unrelated consonant trigrams. With the conceptual words the reversal shift was executed more rapidly but no difference between a reversal and half-reversal was found with the trigrams. Experiment II found that overlearning up to 40 post-criterion trials had only minimal effects on reversal shifts involving trigrams. In Exp. III four kinds of shifts (one-quarter, one-half, three-quarters, and full-reversal) were compared with both conceptual words and trigrams. The full-reversal with conceptual instances proved to be the easiest. Experiment IV, in which Ss initially sorted the conceptual instances into mixed categories and then shifted into either conceptually consistent categories or a reversal shift, showed the latter to be more difficult, suggesting that the accessibility of the representational response was more important to post-shift behavior than the reversal shift per se. The relevance of these results to mediational S-R theory and the verbal-loop hypothesis is discussed. (Author)
AD-666 632 Not available from CFSTI.

DETECTABILITY THEORY AND THE INTERPRETATION OF VIGILANCE DATA.
Research paper,
Defence Research Medical Labs Toronto (Ontario)
M. M. Taylor. 1967, 10p Rept no. DRML-RP-655
Availability: Published in Acta Psychologica, v27 p390-9 1967.

Descriptors: (*Target discrimination, *Performance (Human)), Attention, Mathematical prediction, Probability, Reaction (Psychology), Canada.
Identifiers: Detection theory.

The concept of subjective probability forms the basis of a brief summary of the theory of discrimination. The concept of likelihood ratio is considered as an interpretive convenience, rather than as a conceptual necessity, and is used to introduce the familiar ROC curve. Interpretation of vigilance data is discussed in terms of the expected form of the relevant ROC curves. For the detection of signals in a steady background, the typical paradigm of a vigilance experiment, the ROC curve may be severely skewed. When the data depend on a single operating point, the tabulated indices of detectability, d', and of caution, beta, may give misleading impressions of actual detection behavior. The tabulated value of beta will always be higher than the true beta, usually drastically so, while the tabulated value of d' will usually, but not always, be higher than the true value of d'. The tabulated values will show correlation, which may be either positive or negative, across observers in situations where the true values of d' and beta would show no correlation. Though the tabulated measures may be of dubious value, the concepts of detection theory remain useful in the analysis of vigilance. (Author)
AD-666 635 Not available from CFSTI.

MONKEY PERFORMANCE TESTING APPARATUS (MAZE),
Armed Forces Radiobiology Research Inst Bethesda Md
For primary bibliographic entry see Field 6L.
AD-666 643 HC$3.00 MF$0.65

TRANSFORMATIONAL PROCESSES AND REMEMBERING.
Final rept.,
Louisville Univ Ky
John A. Robinson. 1 Feb 68, 10p
AFOSR-68-0528
Grant AF-AFOSR-1008-66

Descriptors: (*Recall, Performance (Human)), Verbal behavior, Learning, Coding, Transformations.
Identifiers: Information processing (Psychology).

Two types of problems were investigated: (1) The role of encoding and decoding rule learning and rule interference in what is, ostensibly, a nonsense--anagram list learning experiment; (2) the nature and role of organizational processes in multitrial free recall. The materials used in these experiments were codeable trigrams (e.g. RJA; JAR) and categorizeable words (e.g. flute, trumpet; week, day, etc.). The results of seven experiments on coding produced the following conclusions: (1) Subjects do learn and use both encoding and decoding rules. (2) Intralist encoding or decoding rule interference is a significant determinant of performance. (3) Sufficient structure can be built into these anagram materials to completely offset what have been assumed to be the detrimental effects of coding. The results of the experiments in free recall document the occurrence of intercategory organization (CO) as well as the more familiar intracategory organization. Using techniques from graph theory it was possible to show that the degree of CO observed is greater than chance, and that CO is highly correlated with category recall. One theoretical conclusion of special interest was that hierarchical models of retrieval are inadequate as an explanation of these data. (Author)
AD-666 686 HC$3.00 MF$0.65

THE LEARNING OF PSYCHOMOTOR SKILLS.
Rept. for 1 May 63-30 Apr 66,
Georgia Univ Athens
Clyde E. Noble. 1968, 48p
Grant AF-AFOSR-1099-66
Availability: Published in Annual Review of Psychology, v19 p203-50 1968.

Descriptors: (*Motor reactions, Reviews), (*Learning, Motor reactions), Psychomotor tests, Memory, Verbal behavior, Performance (Human), Psychometrics, Test construction (Psychology), Transfer of training, Group dynamics, Tracking, Cybernetics, Retention, Attention.

A review of the research literature on the learning of psychomotor skills is presented. Topics discussed include: Major works; Historical trends; Selective learning; Tracking; Feedback and cybernetics; Retention and transfer.
AD-666 709 Not available from CFSTI.

THE LARGE AND SMALL OF LEARNING,
Georgia Univ Athens
Clyde E. Noble. 1968, 3p
Grant AF-AFOSR-1099-66
Review of 'The Psychology of Learning' by John F. Hall.
Availability: Published in Contemporary Psychology, v13 n1 p10-2 Jan 1968.

Descriptors: (*Learning, Reviews), Stimulation, Reaction (Psychology), Conditioned reflex, Behavior, Performance (Human), Psychomotor tests.
Identifiers: *Book reviews.

Professor Hall's explicit aim, as stated in his Preface is to provide 'for the advanced undergraduate' a textbook in learning 'which includes much of the material traditionally encompassed in its study.' Hall explains that the rationale of his organization is to examine 'those variables and/or conditions which contribute to the learning process' and states his intention to discuss 'a variety of learning situations' rather than limit himself to 'one or two of the traditional categories.'
AD-666 710 Not available from CFSTI.

EFFECT OF D-TUBOCURARINE ON THE SCALING OF EFFORT OF ISOMETRIC MUSCLE CONTRACTIONS.
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 6O.
AD-666 749 HC$3.00 MF$0.65

CLINICAL INVESTIGATIONS OF STUTTERING. I. ADJUSTMENT AND EFFECTIVENESS OF STUTTERERS IN MILITARY SERVICE.
Final rept. Mar 65-Jan 68,
Walter Reed Army Medical Center Washington D C Audiology and Speech Center
William S. Rosenthal, and Rex V. Naylor. Jan. 68, 23p

Descriptors: (*Speech, Pathology), (*Adjustment (Psychology), Military personnel), Performance (Human), Therapy, Military psychology, Statistical data.
Identifiers: Stuttering.

The adjustment and effectiveness of stutterers in military life were studied by comparing their performance in various areas with the performance of the Army as a whole. It was concluded that stutterers probably do not differ as a group from the over-all Army in the type of occupational specialties held, rates of promotion, and incidence of disciplinary action. This ability to adjust and perform effectively is independent of any treatment of the disorder although it is assumed that successful therapy would allow the stutterer to be even more effective by releasing energies otherwise directed at the management of his difficulties in communication. (Author)
AD-666 782 HC$3.00 MF$0.65

CLINICAL INVESTIGATIONS OF STUTTERING: II. TREATMENT AND FOLLOW-UP OF THE ADULT STUTTERER.
Final rept. Mar 65-Jan 68,
Walter Reed Army Medical Center Washington D C Audiology and Speech Center
Rex V. Naylor, and William S. Rosenthal. Jan 68. 70p
See also AD-666 782.

Descriptors: (*Speech, Pathology), Therapy, Effectiveness, Personality, Attitudes, Psychometrics, Statistical analysis, Adjustment (Psychology), Performance (Human), Behavior, Emotions, Rehabilitation, Military personnel, Military psychology.
Identifiers: Stuttering.

The aim of the study was to evaluate a program of therapy for stutterers, including a follow-up six months after therapy was terminated. An attempt was made to measure changes in selected personality factors as well as in attitudes toward speaking and in the audible and visible characteristics of stuttering, as a result of therapy. An attempt to find a reliable predictor of therapeutic outcome was unsuccessful. The present study helps to establish that (1) statistically significant changes in both speech and personality variables may occur during relatively short-term, intensive speech therapy that includes a psychotherapeutic orientation; and (2) in general, these changes tend to persist over a period of at least six months following the end of therapy. Two estimates of progress--therapists' ratings and psychometric measures--showed a moderate degree of agreement. When therapists' and clients' ratings were compared, the latter consistently tended to rate themselves higher than did the therapists. (Author)
AD-666 783 HC$3.00 MF$0.65

THE EFFECT OF ANGLE BETWEEN THE OBLIQUE LINES ON THE DECREMENT OF THE MUELLER-LYER ILLUSION WITH EXTENDED PRACTICE,
Calgary Univ (Alberta)
Robert E. Dewar. 1967, 3p
Availability: Published in Perception and Psychophysics, v2 n10 p425-8 1967.

Descriptors: (*Illusions, *Visual perception), Vision, Performance (Human), Psychophysics, Analysis of variance.

Early work on the Muller-Lyer illusion had indicated that it disappears with extended practice. The present experiment failed to confirm this finding. The magnitude of the illusion decreased for approximately 500 trials, but showed no further change over an additional 500 trials. The rate of the practice decrement was inversely related to the size of the angle formed by the oblique lines of the figure. (Author)
AD-666 845 Not available from CFSTI.

ORDER OF REPORT AND PROCESSING IN TACHISTOSCOPIC RECOGNITION,
Waterloo Univ (Ontario)
A. O. Dick, and D. J. K. Mewhort. 1967, 4p
Grant DRB-9401-26
Prepared for presentation at the Meetings of the Canadian Psychological Association, Ottawa, 1967.
Availability: Published in Perception and Psychophysics, v2 n12 p573-6 1967.

Descriptors: (*Visual perception, *Memory), Numbers, Recall, Visual signals, Accuracy, Performance (Human), Sequential analysis, Psychophysics, Canada.
Identifiers: Information processing (Psychology), *Tachistoscopic recognition.

Two groups of 12 Ss were shown tachistoscopically 4 letters and 4 numbers. Within these alpha-numeric sequences, three variables were systematically manipulated: grouping of items, initial item, and familiarity of the letter sequences. One group of Ss reported first letters then numbers from each sequence; the other group reported numbers then letters. The results indicated that grouping, redundancy, and order of report had significant effects on letter accuracy but not on number accuracy. These effects were interpreted in terms of processing, particularly the use of spatial and identity information during recognition. (Author)
AD-666 850 Not available from CFSTI.

PHOTOKINESIS IN THE TELEOST FISH DANIO MALABARICUS.
Louvain Univ (Belgium) Centre de Psychologie Experimentale Et Comparee
For primary bibliographic entry see Field 6C.
AD-666 853 Not available from CFSTI.

ATTITUDES OF PSYCHOLOGISTS TOWARD THEIR JOBS.
Texas Christian Univ Fort Worth Inst of Behavioral Research
For primary bibliographic entry see Field 5I.
AD-666 854 HC$3.00 MF$0.65

SEX DIFFERENCES IN THE MAGNITUDE AND PRACTICE DECREMENT OF THE MULLER-LYER ILLUSION,
Calgary Univ (Alberta)
Robert E. Dewar. 1967, 2p
Availability: Published in Psychon. Sci. v9 n6 p345-6 1967.

Descriptors: (*Illusions, Visual perception), Vision, Performance (Human), Sex, Psychophysics, Attention, Analysis of variance.

A comparison was made between male and female Ss on the magnitude and practice decrement of the Muller-Lyer illusion. Over a series of 400 trials, female Ss showed a slightly (but not significantly) higher illusion than did males. Male Ss showed a more rapid practice decrement than did females. The results were discussed in terms of field-dependence and attention. (Author)
AD-666 856 Not available from CFSTI.

EFFECT OF AROUSED TESTING CONDITIONS ON THE MEASUREMENT OF FEAR OF FAILURE.
Technical rept.,
Bucknell Univ Lewisburg Pa
Richard C. Teevan, and Richard A. Dapra. May 68, 21p Rept no. TR-25
Contract Nonr-3591 (01)

Descriptors: (*Motivation, Psychometrics), Projective techniques, Stress (Psychology), Anxiety, Reaction (Psychology), Defense mechanisms (Psychology).
Identifiers: Thematic Apperception Test.

The Thematic Apperception Test (TAT) was administered to 38, male, high school Ss under both neutral and aroused conditions. The TATs were scored for fear of failure (FF) motivation as measured by the Hostile Press (HP) system developed by Birney, Burdick, and Teevan (1964). An exploratory investigation was conducted to determine the effect of aroused and neutral testing conditions on the amount of HP imagery and its intensity within the same group of Ss. The results indicated that HP scores increased significantly between the neutral and aroused conditions. Nevertheless, a dichotomy of the HP scores at the median indicated that the scores of Ss categorized Low HP under the neutral condition increased significantly under the aroused condition. HP scores of Ss categorized Hi HP under the neutral condition had significantly lower HP scores under the aroused condition. The results were discussed in terms of the FF S's interpretation of the situation and his defensive posture. (Author)
AD-666 963 HC$3.00 MF$0.65

THE RISKY SHIFT IN GROUP BETTING.
Technical rept.,
State Univ of New York Buffalo Dept of Psychology
Dean G. Pruitt, and Allan I. Teger. 15 Mar 68, 30p Rept no. TR-4
Contract N00014-67-C-0190
Report on Studies of the Dynamics of Cooperation and Conflict.

Descriptors: (*Group dynamics, Decision making), Behavior, Probability, Motivation, Social communication, Personality, Social psychology.

Two experiments were performed, involving a similar method. Experiment 1 showed for the first time that group discussion can produce a shift toward greater risk in choices among bets. A risky shift was found in two dimensions of risk taking: probability preferences and stake preferences. This finding made it possible to use bets in the second experiment. In Experiment II, no risky shift was found in a group decision where the members of the group had engaged in past discussions about other issues but were not permitted to discuss or exchange information about the current issue. This result casts doubt on the diffusion of responsibility theory about the risky shift. (Author)
AD-666 975 HC$3.00 MF$0.65

AUDITORY RESPONSES OF NEURONES IN THE LATERAL MESENCEPHALIC NUCLEUS (INFERIOR COLLICULUS) OF THE BARBARY DOVE,
Oxford Univ (England) Inst of Experimental Psychology
For primary bibliographic entry see Field 6P.
AD-667 002 Not available from CFSTI.

DISPLACEMENT ACTIVITIES AND AROUSAL,
Oxford Univ (England) Dept of Zoology
For primary bibliographic entry see Field 6C.
AD-667 012 Not available from CFSTI.

RULE LEARNING AND RULE INTERFERENCE IN TRIGRAM ENCODING.
Scientific interim rept.,
Louisville Univ Ky
John A. Robinson. Mar 68, 10p
AFOSR-68-0596
Grant AF-AFOSR-1008-66
Availability: Published in Psychological Reports, v21 p921-7 1967.

Descriptors: (*Learning, Performance (Human)), Coding, Interference, Verbal behavior, Analysis of variance, Transformations.

The discovery and use of transformational rules as well as subsequent interference among such rules was investigated. 24 single-solution trigrams were permuted from their respective solution-words by a uniform letter-order rule (LOR) and assigned to one of 2 lists. LORs were either the same for both lists or different. Two control groups were included to assess the effects of practice on anagram solution and of prior rule-learning experience. Ss were simply asked to discover and say aloud the solution words. There was no suggestion that rules could be formulated. Comparisons among conditions using mean median solution time for successive blocks of list-items indicated that (a) practice has no effect on solution time with non-rule materials, (b) encoding rule learning does occur, and (c) when rules are changed (List I to List II) solution time increases significantly, i.e., encoding rule interference results. (Author)
AD-667 016 Not available from CFSTI.

BODY FORM AND BEHAVIOURAL TYPES IN FISH,
Louvain Univ (Belgium) Laboratoire de Psychologie Animale
For primary bibliographic entry see Field 6C.
AD-667 029 Not available from CFSTI.

DEFENSIVE BEHAVIOUR AND THE AFTER EFFECTS OF BRAIN STIMULATION IN THE RING DOVE (STREPTOPELIA RISORIA),
Oxford Univ (England) Inst of Experimental Psychology
D. Harwood, and D. M. Vowles. Mar 68, 25p
AFOSR-68-0606
Grant AF-EOAR-14-65
Availability: Published in Neuropsychologia, v5 p345-66 1967.

Descriptors: (*Behavior, Birds), Defense mechanisms (Psychology), Brain, Stimulation, Reaction (Psychology), Responses, Psychophysiology, Thalamus, Great Britain.

Aggressive, defensive and fearful behaviour was elicited in ring doves by electrical stimulation of the forebrain, hypothalamus and midbrain. Stimulation in the forebrain produced very variable results: responses elicited from the midbrain were very stereotyped. Strong stimulation in the hypothalamus produced prolonged changes in the electrical thresholds for behaviour. The thresholds were raised after aggressive or defensive responses, and lowered after fear. Similar changes could be induced by natural stimulation, and there was an interaction between the after effects of natural and electrical stimulation. The magnitude of the after effects declined with repeated stimulation. (Author)
AD-667 045 Not available from CFSTI.

THE EFFECTS OF INTRALIST ACTIVITY ON FREE RECALL,
New York Univ N Y
Murray Glanzer, and Arthur Meinzer. 17 May 66, 8p
Contract DA-49-193-MD-2496
Availability: Published in Journal of Verbal Learning and Verbal Behavior, v6 n6 p928-35 Dec 1967.

Descriptors: (*Recall, *Word association), Verbal behavior, Learning, Performance (Human), Analysis of variance, Memory.

Two experiments were carried out to determine the effects of S's intralist activity on free recall, and to relate these effects to a two-storage model of free recall. In the first experiment associative or mnemonic structure was varied. The freedom of the S to make use of the interval was also varied by requiring an interpolated task during the interval between words. Both variables had a clear effect on recall. No evidence was found, however, for a differential effect of these variables on the serial-position curve. The differential effect was expected on the basis of the two-storage model of recall. In the second experiment, an intralist task was used that, on the basis of the two-storage model, was designed to have a differential effect. Both an overall effect of the task (word repetition) and a differential effect with respect to list positions were found. When S repeated the list words as they were presented, he recalled fewer words and, in particular fewer words from the beginning of the list. (Author)
AD-667 058 Not available from CFSTI.

THE EFFECT OF ENCODING TRAINING ON PERCEPTUAL RECALL,
New York Univ N Y
Murray Glanzer, and Joseph Fleishman. 3 Aug 67, 4p
Contract DA-49-193-MD-2496
Prepared in cooperation with Yeshiva Univ., New York.
Availability: Published in Perception and Psychophysics, v2 n12 p561-5 1967.

Descriptors: (*Recall, *Visual perception), Training, Coding, Memory, Performance (Human), Learning, Verbal behavior, Analysis of variance.
Identifiers: Information processing (Psychology).

The effect of encoding training on tachistoscopic performance was measured by training groups of Ss in either an octal or a standardized English encoding of nine place binary numbers. A control group of Ss was allowed to encode ad lib during an equivalent training period. Performance was measured before, during and after the encoding training. It was found that imposing a code on S impaired tachistoscopic performance both during and for some time after the encoding training. Possible reasons for this effect are discussed. (Author)
AD-667 059 Not available from CFSTI.

ON THE SIGMOIDAL LAW RELATING ASSOCIATION VALUE (a) AND SCALED MEANINGFULNESS (m'),
Georgia Univ Athens
Clyde E. Noble, Patricia B. Sutker, and Helen R. Jones. 26 Jan 68, 12p
Contract Nonr-3677 (02), Grant AF-AFOSR-1099-66
Availability: Published in Perceptual and Motor Skills, v26 p375-86 1968.

Descriptors: (*Word association, *Psychometrics), Learning, Verbal behavior, Analysis of variance, Reliability, Performance (Human), Tables.

This study was conducted to test an inductive hypothesis, based on judgments of the relative number of associations (a') evoked by 2100 CVC trigrams in 200 Montana college Ss, that association value (a) is a sigmoidal function of scaled meaningfulness (m'). Whereas the earlier investigation used a representative sample of only 21 CVCs to compute m', we selected 500 stimuli from the full range of values and had them rated by 200 Georgia college Ss. Measures of reliability for the a' scale (r = .993) and of internal consistency for the m' scale (average error = 2.8%) are again very high. The cross-cultural regressions for the a and m' scales are both linear, with r > or = .97 for mean scores grouped in 25 categories of 20 CVCs each. Confirming and extending Noble's 1957 and 1961 findings, the present function relating a and m' is clearly S-shaped and may be regarded as an empirical law. The analysis-of-variance (eta sq) test of curvilinearity, applied to 12 equidistant groupings using all 500 CVCs, is significant (P < .001). Among the major implications are: (1) the contemporary m' scale is superior to the classical a scale and its cognates, (2) the practice of treating these two variables as identical or even linearly related is erroneous, (3) continued equivocation about a and m' in research on verbal behavior can lead to serious errors of prediction and faulty explanatory inferences. (Author)
AD-667 104 Not available from CFSTI.

QUARTERLY BULLETIN OF THE DIVISION OF MECHANICAL ENGINEERING AND THE NATIONAL AERONAUTICAL ESTABLISHMENT.
National Research Council of Canada Ottawa (Ontario) Div of Mechanical Engineering
For primary bibliographic entry see Field 5B.
AD-667 180 HC$3.00 MF$0.65

HIGHWAY SEVERANCE STUDY NUMBER 9, WESTERN KENTUCKY PARKWAY, ELIZABETHTOWN TO LEITCHFIELD, HARDIN COUNTY, GRAYSON COUNTY.
Kentucky Dept. of Highways. Div. of Right of Way.
For primary bibliographic entry see Field 13B.
PB-177 149 HC$3.00 MF$0.65

EVALUATION SYSTEM FOR COMMUNITY ACTION PROGRAMS. PHASES I-III.
Basic Systems Inc., New York.
For primary bibliographic entry see Field 13B.
PB-177 428 HC$3.00 MF$0.65

5K. Sociology

U.S. ARMY AREA HANDBOOK FOR PANAMA.
American Univ., Washington, D. C. Foreign Area Studies Div.
For primary bibliographic entry see Field 5D.
AD-472 796 HC$3.00 MF$0.65

A REVIEW OF RECENT RESEARCH AND DEVELOPMENT ON MILITARY LEADERSHIP, COMMAND, AND TEAM FUNCTION.
George Washington Univ., Alexandria, Va. Human Resources Research Office.
For primary bibliographic entry see Field 5I.
AD-478 288 HC$3.00 MF$0.65

A SOCIO-DEMOGRAPHIC ANALYSIS OF ST IGNATIUS-KUMU, RUPUNUNI DISTRICT.
Mcgill Univ Montreal (Quebec) Dept of Geography
For primary bibliographic entry see Field 8F.
AD-666 617 HC$3.00 MF$0.65

METHODOLOGY OF 1965 POPULATION ESTIMATES BY SMALL AREA UNITS,
Chicago Area Transportation Study, Ill.
Gangu K. Ahuja. Jan 68, 49p Rept. no. 311031-VI

Descriptors: (*Population, Counting methods), Statistical processes, Mobility, Housing, Construction, Classification, Terrain, Urban areas, Tables.
Identifiers: Chicago area.

The report is a documentation of the techniques applied by the Chicago area transportation study to develop estimates of 1965 population. The different methods for developing aggregate population estimates are discussed. For population estimates by municipality and township, classified as intermediate units, it was recognized that the component method could not be used. The inability to utilize this preferred method was caused by a lack of detailed data on births, deaths and migration. Consequently, a method based on building permit data was used for intermediate units. Finally, population was allocated to analysis zones via a four step procedure. This method considered classification and scaling of the land area in each zone. (Author)
PB-177 299 HC$3.00 MF$0.65

EVALUATION SYSTEM FOR COMMUNITY ACTION PROGRAMS. PHASES I-III.
Basic Systems Inc., New York.
For primary bibliographic entry see Field 13B.
PB-177 428 HC$3.00 MF$0.65

RESIDENTIAL LOCATION AND URBAN MOBILITY,
Michigan Univ., Ann Arbor. Survey Research Center.
For primary bibliographic entry see Field 13B.
PB-177 693 HC$3.00 MF$0.65

6. BIOLOGICAL AND MEDICAL SCIENCES

6A. Biochemistry

COMPARATIVE BIOSYNTHESIS OF ORNITHINE AND LYSINE BY MYCOPLASMA AND L FORMS,
South Dakota Univ Vermillion Dept of Microbiology
For primary bibliographic entry see Field 6M.
AD-666 637 Not available from CFSTI.

MOLECULAR BIOLOGY APPLICATIONS OF MASS SPECTROMETRY.
Final rept. 1 Jul 65-31 Dec 67,
Stanford Univ Palo Alto Calif Instrumentation Research Lab
Joshua Lederberg, and Elliott C. Levinthal. 31

Dec 67, 53p Rept no. IRL-1073
AFOSR-68-0529
Contract AF 49 (638)-1599

Descriptors: (*Mass spectroscopy, Biochemistry), (*Polymers, Mass spectroscopy), Vaporization, Stereochemistry, Lasers, Amino acids, Nucleosides, Peptides, Control systems, Digital computers, Data processing systems, Display systems.
Identifiers: *Macromolecular biology, Molecularization.

Summaries are given of research efforts in the following areas: Volatilization of molecules of biological interest; spectral analysis of monomers; computer control of mass spectrometers; data retrieval and display; computer manipulation of chemical hypotheses. References to papers previously published in professional journals and technical reports are included.
AD-666 667 HC$3.00 MF$0.65

KINETICS STUDIES ON HEMOPROTEINS BY FLASH PHOTOLYSIS.
Final scientific rept. 31 Jan 67-31 Jan 68,
Rome Univ (Italy) Istituto Di Chimica Biologica
Eraldo Antonini. 31 Jan 68, 7p
AFOSR-68-0524
Grant AF-EOAR-28-67
See also AD-648 666.

Descriptors: (*Proteins, Photolysis), (*Hemoglobin, *Photochemistry), Dissociation, Reaction kinetics, Oxygen, Carbon monoxide, Molecular association, Spectroscopy, Italy.

Results in the following areas of investigation are summarized: kinetic effects of the reversible dissociation of hemoglobin into side chain molecules; reaction of isolated alpha-CO and beta-CO hemoglobin chain to form hemoglobin (alpha-2 beta-2) (CO)4; kinetic behavior on flash photolysis of the high molecular weight hemoglobin from the earthworm; spectral difference between the deoxygenated hemoglobin chains and hemoglobin.
AD-666 691 HC$3.00 MF$0.65

PHOTOSYNTHETIC REACTIONS OF CHLOROPLASTS WITH UNUSUAL STRUCTURES.
Florida State Univ Tallahassee Dept of Biological Science
For primary bibliographic entry see Field 6C.
AD-666 714 Not available from CFSTI.

STUDIES ON THE MANGANESE OF THE CHLOROPLAST,
Florida State Univ Tallahassee
For primary bibliographic entry see Field 6C.
AD-666 724 Not available from CFSTI.

FRAGMENTATION OF GUINEA PIG COMPLEMENT COMPONENTS C'2 AND C'3c,
Johns Hopkins Univ Baltimore Md Dept of Microbiology
Manfred M. Mayer, Hyun S. Shin, and Jimmie A. Miller. 1967, 7p
Contract Nonr-248 (60), Grant NSF-GB-2597
Availability: Published in Protides of the Biological Fluids, v15 p411-7 1967.

Descriptors: (*Complement, Purification), Chromatographic analysis, Electrophoresis, Separation, Molecular weight, Immunology, Guinea pigs.

Studies are presented of the cleavage of C'2 by C'1a and of the fragmentation of C'3c by C'4,2a. While these experiments are still in their early stages, they suggest the general nature of these reactions. The study of fragmentation of complement components is important not only from a chemical viewpoint, but also in relation to the diverse biologic activities of the complement system. Already there are indications that some inflammatory phenomena evoked by complement may be attributed to certain fragments. Hence, the isolation and characterization of the reaction products of the C' sequence has now become of great interest to students of immunopathology. (Author)
AD-666 734 Not available from CFSTI.

SYNTHESIS OF POLY-O-tert-BUTYL-L-SERINE AND POLY-L-SERINE,
Brandeis Univ Waltham Mass Graduate Dept of Biochemistry
Nancy M. Tooney, and Gerald D. Fasman. 1968, 16p Rept no. Pub-540
Contract DA-49-193-MD-2933, Grant NSF-GB-5576
Research supported in part by NIH.
Availability: Published in Biopolymer, v6 p81-96 1968.

Descriptors: (*Peptides, Synthesis (Chemistry)), Amino acids, Polymerization, Stereochemistry, Anhydrides, Catalysis, Reaction kinetics, Copolymerization.
Identifiers: Serine, Polyserines, Polybutylserines, Block polymers.

The synthesis of polymers containing O-tert-butyl-L-serine, O-tert-butyl-DL-serine, L-serine, and DL-serine is reported. The N-benzyloxycarbonyl-(L or DL)-serine benzyl ester was used to synthesize the corresponding N-benzyloxycarbonyl-O-tert-butyl- (L or DL)-serine benzyl ester. Catalytic hydrogenation of this material gave O-tert-butyl-(L or DL)-serine. The reaction O-tert-butyl- (L or DL)-serine with phosgene produced the corresponding N-carboxyanhydrides. The kinetics of polymerization of N-carboxyanhydrides were investigated to facilitate the preparation of block copolymers. The O-tert-butyl blocking group was removed from polymers by treatment with HCl and HBr in benzene. Both high molecular weight (water-insoluble) and low molecular weight (water-soluble) homopolymers were prepared, as well as water-soluble block copolymers of the type (DL-serine)x (L-serine)y (DL-serine)z. (Author)
AD-666 736 Not available from CFSTI.

IN VITRO DETERMINATION OF PLASMA INSULIN USING 125I AND LIQUID SCINTILLATION SPECTROMETRY.
Rept. for Aug-Oct 67,
School of Aerospace Medicine Brooks AFB Tex
Donald F. Logsdon, Jr., James F. Green, and Orville L. Langford. Jan 68, 9p Rept no. SAM-TR-68-1

Descriptors: (*Insulin, Tracer studies), Scintillation counters, Spectrometers, Efficiency, Accuracy, Counting methods, In vitro analysis, Blood chemistry, Blood plasma.

A procedure for the immunoassay of insulin levels using insulin 125I as a tracer was modified to allow the samples to be measured by means of a liquid scintillation spectrometer. The optimal instrument settings and scintillation fluid system were determined. The absolute efficiency was found to be 21.4%. The components making up the sample were individually tested and found to have no effect on the count rate. The percent change in activity with increasing amounts of added cold insulin (over the range 0 to 500 micro U.) was determined using both the liquid scintillation system and the gamma spectrometer. No significant difference was found between the two methods in terms of accuracy or ease of accomplishing the procedure. The two systems are considered interchangeable for counting insulin 125I samples. (Author)
AD-666 904 HC$3.00 MF$0.65

DETERMINING INSULIN LEVELS USING INSULIN I 125 AND INSULIN-BINDING REAGENT.
School of Aerospace Medicine Brooks AFB Tex
For primary bibliographic entry see Field 6P.
AD-666 908 HC$3.00 MF$0.65

RESEARCH IN PHOTOBIOLOGY AND PHOTOCHEMISTRY.
Final rept. 1 May 65-30 Apr 67,
Florida State Univ Tallahassee Dept of Biological Science
H. Gaffron. 1 Feb 68, 6p
AFOSR-68-0493
Grant AF-AFOSR-662-65

Descriptors: (*Photosynthesis, *Catalysts), Manganese, Chloroplasts, Plants (Botany), Deficiency diseases, Metabolism, Dehydration.

A summary is given of investigations of the manganese content of chloroplasts, activation of photosynthesis by manganese, two types of damage in higher plants due to manganese deficiency, and the distribution of manganese in structurally different chloroplasts in relation to particular metabolic activities displayed by such chloroplasts. Another investigation dealt with the response of photosynthesis and respiration to desiccation in the fern Polypodium polypodioides. (Author)
AD-666 912 HC$3.00 MF$0.65

AUTOMATED DETERMINATION OF GLUCOSE USING GLUCOSE OXIDASE AND POTASSIUM FERROCYANIDE.
Final rept. 1 May-30 Sep 67,
School of Aerospace Medicine Brooks AFB Tex
James W. Hall, and Donald M. Tucker. Jan 68, 11p Rept no. SAM-TR-68-4

Descriptors: (*Glucose, Chemical analysis), Oxidoreductases, Potassium compounds, Iron compounds, Cyanides, Blood, Blood chemistry, Automatic.
Identifiers: Potassium ferrocyanide.

A study was undertaken to find a rapid, accurate, and reproducible method for determining blood glucose. For these reasons, the decision was made to adapt the glucose-oxidase procedure for use on an automatic system. It was subsequently found, however, that existing technics did not meet all the criteria specified. The procedure was modified so that the problem of carry-over (encountered when o-tolidine or o-dianisidine is used) was eliminated. (Author)
AD-666 925 HC$3.00 MF$0.65

REGULATION OF LIPID TRANSPORT AND DEPOSITION: EFFECTS OF NICOTONIC ACID.
Milan Univ (Italy) Inst of Pharmacology
For primary bibliographic entry see Field 6P.
AD-666 926 HC$3.00 MF$0.65

RELATION OF STRUCTURE TO FUNCTION IN HEMOGLOBIN.
Scientific Interim rept.,
Minnesota Univ Minneapolis Dept of Chemistry
Rufus Lumry. Mar 68, 45p
AFOSR-68-0491
Grant AF-AFOSR-1222-67

Descriptors: (*Hemoglobin, Biochemistry), Molecular structure, Molecular association, Quantitative analysis, Anesthetics, Nitrogen, Erythrocytes, Oxygen.

The specific goals of this project were: (1) To establish the factors determining the oxygen affinity of mammalian hemoglobins. (2) To determine from these factors the basis for the serious inconsistencies now existing between quantitative observations on hemoglobin and the predictions from currently accepted models for hemoglobin. (3) To determine the factors influencing the oxygen-binding of mammalian myoglobin so as to establish reliable sets of experimental conditions for study of this protein. (4) To determine the degree of involvement of protein conformation in the oxygen-binding reactions of hemoglobin and myoglobin. (5) To provide a detailed quantitative description of the molecular mechanism of oxygen binding to hemoglobin and myoglobin. (6) To provide a basis for interpretation of the variation of the ligand-binding properties of blood under physiological

conditions. (7) To establish the relationship between the effects of small anaesthetics such as xenon, cyclopropane and ethyl ether on the ligand-binding behavior of hemoglobin and myoglobin and their anaesthetic effects. Nitrogen gas also influences ligand-binding of myoglobin under certain circumstances. (8) To determine the quantitative relationships between the two major species of horse hemoglobin in their possible control of the aging of the horse erythrocyte. (Author)
AD-666 933 HC$3.00 MF$0.65

BASELINE BLOOD VALUES OF THE CHIMPANZEE. II. THE RELATIONSHIP OF AGE AND SEX AND SERUM CHEMISTRY VALUES,
Aeromedical Research Lab (6571st) Holloman AFB N Mex
For primary bibliographic entry see Field 6C.
AD-666 984 Not available from CFSTI.

ALLOSTERIC INTERACTIONS IN ASPARTATE TRANSCARBAMYLASE. I. BINDING OF SPECIFIC LIGANDS TO THE NATIVE ENZYME AND ITS ISOLATED SUBUNITS. II. EVIDENCE FOR DIFFERENT CONFORMATIONAL STATES OF THE PROTEIN IN THE PRESENCE AND ABSENCE OF SPECIFIC LIGANDS. III. INTERPRETATION OF EXPERIMENTAL DATA IN TERMS OF THE MODEL OF MONOD, WYMAN, AND CHANGEUX,
California Univ Berkeley Dept of Molecular Biology
Jean-Pierre Changeux, John C. Gerhart, Howard K. Schachman, and Merry M. Rubin. Feb 68, 32p

Grants PHS-CA-07410, NSF-GB-4810X
Research supported in part by National Cancer Institute, NONR and California Univ.
Availability: Published in Biochemistry, v7 n2 p531-61 1968.

Descriptors: (*Transferases, *Stereochemistry), Molecular association, Molecular structure, Nucleotides, Phosphates, Succinates, Proteins, Enzyme inhibitors, Thiols, Reaction kinetics, Statistical analysis.
Identifiers: Aspartate transcarbamylase, Molecular conformations.

It is shown that the antagonistic and cooperative effects observed in the multiple binding of ligands by aspartate transcarbamylase (ATCase) are indirect. In order to determine whether these allosteric effects are mediated by the protein itself through changes in its tertiary or quaternary structure, physical-chemical studies were conducted of the conformational state of the enzyme both in the presence and absence of specific ligands such as substrates or feedback inhibitors. A detailed analysis according to the two-state model of Monod, Wyman, and Changeux (Monod, J., Wyman, J., and Changeux, J.-P. (1965), J. Mol. Biol. 12, 88) is then made of data obtained for the allosteric interactions of aspartate transcarbamylase from Escherichia coli.
AD-666 996 Not available from CFSTI.

FURTHER STUDIES ON THE IMMUNOGENICITY OF D-AMINO ACID POLYMERS,
Weizmann Inst of Science Rehovoth (Israel) Section of Chemical Immunology
Yehudit Stupp, and Michael Sela. Mar 68, 12p
AFOSR-68-0536
Grant AF-EOAR-19-67
Availability: Published in Biochemica et Biophyica Acta, v140 p349-59 1967.

Descriptors: (*Amino acids, Immunity), Polymers, Antigen-antibody reactions, Immune serums, Peptides, Responses, Molecular structure, Anaphylaxis, Allergy, Israel.

Racemic polymers, composed of D-amino acids and decreasing amounts of L-amino acids (ranging from 42% to 3%) induced antibody formation in rabbits and delayed hypersensitivity in guinea pigs. A polypeptide composed exclusively of D-amino acids, p (D-Tyr,D-Glu,D-Lys), provoked an immune response in rabbits and in guinea pigs. In this case, the dose used for immunizing rabbits was 100 micrograms antigen in complete Freund's adjuvant (CFA). Antisera against either the racemic polymers or the D-amino acid polypeptide was negative in the passive cutaneous anaphylaxis (PCA) test. Antibodies against one of the racemic polymers and against the polypeptide composed exclusively of D-amino acids, were isolated by means of specific immuno-adsorbents and characterized. Purified antibodies gave positive PCA reactions with homologous antigens. (Author)
AD-667 035 Not available from CFSTI.

IMMUNOGENICITY OF HAPTEN CONJUGATES OF POLY-D-TYROSINE.
Scientific interim rept.,
Weizmann Inst of Science Rehovoth (Israel) Section of Chemical Immunology
Felix Borek, Yehudit Stupp, and Michael Sela.
Mar 68, 5p
AFOSR-68-0537
Grant AF-AFOSR-19-67
Availability: Published in Biochimica et Biophysica Acta, v140 p360-2 1967.

Descriptors: (*Tyrosine, Immunity), Antigen-antibody reactions, Injection (Medicine), Anaphylaxis, Polymers, Molecular weight, Molecular structure.

The report describes the immune response of randomly bred guinea pigs to Rp conjugates of N-acetyl-D-tyrosine amide and of two preparations of poly-D-tyrosine with the average degrees of polymerization n37 and n626, respectively. Poly-D-tyrosine, n37, was prepared using dimethylformamide as the solvent for the N-carboxyanhydride of D-tyrosine and n-butylamine as the polymerization initiator. Poly-D-tyrosine, n626, was prepared using dioxane as the solvent and sodium methoxide as the polymerization initiator. Under these conditions relatively long polymeric chains are usually obtained. (Author)
AD-667 036 Not available from CFSTI.

UROBILINOID DERIVATIVES OF PHYCOERYTHROBILIN, A PROSTHETIC GROUP OF R-PHYCOERYTHRIN,
University Coll Galway (Ireland) Dept of Biochemistry
M. F. Murray, and C. O'hEocha. Mar 68, 4p
AFOSR-68-0531
Grant AF-EOAR-18-63
Availability: Published in Indian Journal of Biochemistry, v4 n2 p19-20 1967.

Descriptors: (*Bile pigments, Molecular structure), Algae, Tissue extracts, Mass spectrum, Great Britain.
Identifiers: Urobilins, Phycoerythrobilin.

Data are presented which support the suggestion of Cole and O'hEocha that catalytic urobilin peb, although optically active, is very similar in structure to i-urobilin and lend support to the structure proposed earlier for phycoerythrobilin; however, the results do not exclude the possibility that phycoerythrobilin contains an acrylic acid side chain which is reduced during the formation of catalytic urobilin peb. A urobilin isomeric with phycoerythrobilin was also prepared and its ethanethiol adduct and dimethyl ester were obtained in the crystalline state. Mass spectral analyses did not give a clear-cut indication of the structure of this urobilin. The ethanethiol adduct had a mol. wt of 648, corresponding to a mol. wt of 586 for the parent urobilin, and while the spectrum of the dimethyl ester was ambiguous, a weak peak at m/e 614 suggested the same molecular weight for the isomeric urobilin. (Author)
AD-667 040 Not available from CFSTI.

Gm FACTORS IN NON-HUMAN PRIMATES.
California Univ San Francisco Medical Center
For primary bibliographic entry see Field 6C.
AD-667 054 Not available from CFSTI.

THE FORMATION OF VERDOHAEMOCHROME FROM PYRIDINE PROTOHAEMICHROME BY EXTRACTS OF RED ALGAE AND OF LIVER,
University Coll Galway (Ireland) Dept of Biochemistry
R. F. Murphy, C. O'hEocha, and P. O. Carra.
Mar 68, 4p
AFOSR-68-0532
Grant AF-EOAR-18-63
Availability: Published in Biochemical Journal, v104 p6-8 1967.

Descriptors: (*Algae, Organic pigments), (*Organic pigments, *Photosynthesis), Bile pigments, Proteins, Complex compounds, Tissue extracts, Porphyrins, Pyridines, Decomposition, Great Britain.
Identifiers: Biliproteins, Pyridine protohemichromes, Verdohemichrome.

A search was made for porphyrin-cleaving activity in red algae, in which bile pigment-protein complexes (biliproteins) participate in the light reactions of photosynthesis. Such activity was found in extracts of acetone-dried powders of Porphyra umbilicalis (formerly P. laciniata) and other red algae that were collected on the shores of Galway Bay. However, the results indicate that this activity, and the activity from ox liver, is entirely nonenzymic, at least in the assay system of Nakajima et al. (Author)
AD-667 056 Not available from CFSTI.

USE OF SYNTHETIC POLYPEPTIDES IN STUDIES ON THE CONTROL OF ANTIBODY FORMATION.
Scientific interim rept.,
Weizmann Inst of Science Rehovoth (Israel) Section of Chemical Immunology
Michael Sela. Mar 68, 18p
AFOSR-68-0534
Grant AF-EOAR-19-67
Availability: Published in Proceedings Nobel Symposium III Gamma Globulins Structure and Control of Biosynthesis, Stockholm, 1967 p455-71.

Descriptors: (*Antigens + antibodies, Biosynthesis), Peptides, Immune serums, Synthesis (Chemistry), Antigen-antibody reactions, Chromatographic analysis, Immunity, Molecular structure, Electrophoresis, Tolerances (Physiology), Genetics, Responses, Serum albumin, Israel.

The studies demonstrate the usefulness of synthetic antigens and of peptidylated proteins in the elucidation of such immunological phenomena as antigenic competition, experimental tolerance and genetic control of immune response. The correlation between the net electrical charge of an antigen and that of the antibodies at elicits, shows clearly that the antigen is not just an inert carrier to which specificity determinants are attached, but rather that the biosynthesis of the antibody is controlled both by the specificity determinants, in the formation of the specific combining sites, and by other parts of the antigenic molecule, in defining areas of the antibody which do not include the antibody combining sites. The common denominator of the several sets of experiments described in this lecture is the conclusion that there is much more to antibody formation than the specificity by the antigenic determinant. (Author)
AD-667 093 Not available from CFSTI.

NEIGHBORING GROUP EFFECTS IN PHOSPHONATE ESTER HYDROLYSIS. I. NEIGHBORING CARBONYL GROUP IN PARANITROPHENYL PHENACYL METHYLPHOSPHONATE.
Edgewood Arsenal, Md.
For primary bibliographic entry see Field 7C.
AD-812 673 HC$3.00 MF$0.65

A FLUORESCENT PROBE AT THE ACTIVE SITE OF ALPHA CHYMOTRYPSIN.
Stanford Univ., Calif.
R. P. Haugland, and L. Stryer. 21 Jan 67, 40p
NASA-CR-78109
Contract NGR-05-020-137
Conf- Presented At the Intern. Symp. on Confor-

mation of Biopolymers, Madras Univ., 18-21 Jan. 1967

Descriptors: *Absorption spectra, *Chemical reactions, *Enzymes, *Spectrometers, *X ray fluorescence, Chemical analysis, Emissivity, Enzymology, Proteins, Reaction kinetics, Solvents.

For abstract, see STAR 06 09.
N68-18994 HC$3.00 MF$0.65

6B. Bioengineering

INSTRUMENTATION FOR THE CORIOLIS ACCELERATION PLATFORM.
Naval School of Aviation Medicine, Pensacola, Fla.
W. C. Hixson. 6 Nov 67, 25p NASA-CR-93432, NAMI-1022
NASA ORDER R-93
Prep- Prepared Jointly With Nasa

Descriptors: *Bioinstrumentation, *Coriolis effect, *Human centrifuges, *Test equipment, *Test stands, Acceleration stresses (physiology), Aerospace medicine, Artificial gravity, Physiological tests, Rotating environments, Vertical perception, Vestibular tests.

For abstract, see STAR 06 09.
N68-18497 HC$3.00 MF$0.65

SPIDER CRAB,
National Science Foundation, Washington, D. C. Special Foreign Currency Science Information Program.
Zdravko Stevcic. 1968, 11p SFCSI-Int (TT-67-58034)
Trans. of Morsko Ribarstvo (Yugoslavia) v18 n3/4 p62-5 1966, tr. by Karmela Vlahovic.

Descriptors: (*Crustacea, Ecology), Distribution, Reproduction, Production, Adriatic Sea, Yugoslavia.
Identifiers: Maja squinado.

An account is given of the ecology of the spider crab (Maja squinado), with attention given to fisheries activities.
TT-67-58034 HC$3.00 MF$0.65

6C. Biology

INVESTIGATION OF THE PRIMATE VESTIBULAR SYSTEM FUNCTION THROUGH ANALYSIS OF THE VESTIBULO-OCULAR REFLEX RESPONSE TO VARIOUS INPUT STIMULI.
Air Force Inst of Tech Wright-Patterson AFB Ohio School of Engineering
For primary bibliographic entry see Field 6S.
AD-666 663 HC$3.00 MF$0.65

REPROGRAMMING OF THE SONIC OUTPUT OF THE DOLPHIN: SONIC BURST-COUNT MATCHING.
Annual rept. (Final), 1 Nov 66-31 Oct 67,
Communication Research Inst Miami Fla
John C. Lilly, Alice M. Miller, and Henry M. Truby. 31 Oct 67, 47p
AFOSR-68-0518
Grant AF-AFOSR-415-67
Rept. on Communication Studies on Tursiops Truncatus.

Descriptors: (*Cetacea, *Sound), Marine biological noise, Behavior, Hearing, Humans, Underwater sound, Motivation, Pattern recognition.

The sound producing mechanisms in the bottlenose dolphin (Tursiops truncatus) operate naturally underwater with a closed blowhole. In these experiments Tt's reprogrammability in the vocal airborne mode and in vocal-ascoustic interlock with another species is demonstrated. Human speech output programs were constructed from randomized vowel-consonant (V-C) and consonant-vowel (C-V) lists and simple English words and phrases. The analysis of the dolphin's sonic vocal output in response to these Hs vocal programs demonstrates Tt's reprogramming: in matching number of trains of bursts, interburst silences, and latencies; ability to differentiate between Hs stimuli and other Hs comments or corrections, and ability to program from natural delphinic sounds to 'humanoid' emissions. (Author)
AD-666 690 HC$3.00 MF$0.65

PHOTOSYNTHETIC REACTIONS OF CHLOROPLASTS WITH UNUSUAL STRUCTURES.
Scientific Interim rept.,
Florida State Univ Tallahassee Dept of Biological Science
Peter H. Homann, and George H. Schmid. Mar 68, 15p
AFOSR-68-0496
Contract AT-(40-1)-2687, Grant AF-AFOSR-662-65
Availability: Published in Plant Physiology, v42 n11 p1619-32 1967.

Descriptors: (*Chloroplasts, Photosynthesis), Electron microscopy, Transport properties, Electrons, Mutations, Phosphorylation, Cell structure, Tobacco.
Identifiers: *Electron transport, Thylakoids.

Photosynthetic reactions of whole leaves and isolated chloroplasts from various mutants of Nicotiana tabacum were correlated to the lamellar structure seen in electron micrographs of the chloroplasts. In this way it could be established that a fully active photosystem I can be associated with single unfolded thylakoids. The complete photosynthetic electron transport system including the oxygen evolving apparatus of photosystem II, on the other hand, appears to require a close packing of at least two thylakoids. The unusual high capacity for photosynthesis observed earlier for leaves of certain aurea mutants is reflected by a correspondingly high activity of the isolated chloroplasts in the Hill reaction. These chloroplasts contain extended areas where two thylakoids touch by forming simple lamellar overlappings instead of the familiar stacks of lamellar discs. (Author)
AD-666 714 Not available from CFSTI.

STUDIES ON THE MANGANESE OF THE CHLOROPLAST,
Florida State Univ Tallahassee
Peter H. Homann. Mar 68, 12p
AFOSR-68-0492
Grant AF-AFOSR-662-65
Availability: Published in Plant Physiology v42 n7 p997-1007 Jul 1967.

Descriptors: (*Chloroplasts, *Manganese), Photosynthesis, Deficiency diseases, Algae, Phosphorylation, Chlorophylls, Cell structure, Nucleotides, Oxygen.
Identifiers: Nictotinamide adenine dinucleotide phosphate.

Manganese deficiency of green plants is known to affect preferentially the activity of the oxygen evolving system in the photosynthetic apparatus. Studies showed that the time needed to reactivate photosynthesis in Mn-deficient algae varies with each culture, and is often very short when Mn is added not before illumination but during the light period. The recent finding by Cheniae and Martin that the reactivation requires light, is confirmed. The plain incorporation of 54Mn into deficient algae as distinguished from reactivation was barely affected by light, yet was inhibited by uncouplers of phosphorylation. Higher plants responded to manganese deficiency either by adjusting the number of chloroplasts per cell to the limited Mn supply, or by forming disorganized chloroplasts with low chlorophyll content. These two types of responses produced chlorotic plants which had either a few photosynthetically active or many disabled chloroplasts. Photosystem I mediated photophosphorylation turned out to be much more sensitive to manganese deficiency than the system I dependent photoreduction of NADP (+). (Author)
AD-666 724 Not available from CFSTI.

ARBOVIRUS STUDIES IN SAO PAULO, BRAZIL.
Instituto Adolfo Lutz Sao Paulo (Brazil) Laboratorio de Arbovirus
For primary bibliographic entry see Field 6M.
AD-666 807 HC$3.00 MF$0.65

PRELIMINARY RESULTS CONCERNING THE GAS OF ARTERIAL AND VEINOUS BLOOD IN DELPHINUS DELPHIS AND STENELLA STYX, (CETACEA; ODONTACETES),
Laboratoire de Physiologie Acoustique Jouy-en-Josas (France)
M. Rieu, and M. Hamar. 1968, 6p
Contract F61052-67-C-0063

Descriptors: (*Cetacea, Blood analysis), Gas analysis, Blood chemistry, Oxygen, pH, Carbon dioxide, Acid-base equilibrium, Lactic acid, Respiration, France.

Measurements of the gas content of the blood, of the acido-basic equilibrium, and of the lactic acid content, are indispensible in order to estimate the value of any method for restraining the animal, and for surveillance during the eventual operation. These measurements were the goal of this preliminary study on two small odontocetes, of which the cardiovascular physiology is still not well known. (Author)
AD-666 838 HC$3.00 MF$0.65

PRELIMINARY OBSERVATIONS CONCERNING A METHOD FOR INTRODUCTION OF A TUBE FOR ANAESTHESIA IN SMALL DELPHINIDS,
Laboratoire de Physiologie Acoustique Jouy-en-Josas (France)
M. Rieu, and B. Gautheron. 1968, 7p
Contract F61052-67-C-0063

Descriptors: (*Cetacea, Anesthesia), Surgical techniques, Throat, Acid-base equilibrium, pH, Carbon dioxide, Lactic acid, Blood analysis, Cannulation, Local anesthetics, France.

For anaesthetising small Delphinids where it is difficult to introduce the tube orally, satisfactory preliminary attempts at introduction into the larynx by the naso-pharyngeal passage are reported. (Author)
AD-666 839 HC$3.00 MF$0.65

PHOTOKINESIS IN THE TELEOST FISH DANIO MALABARICUS.
Doctoral thesis,
Louvain Univ (Belgium) Centre de Psychologie Experimentale Et Comparee
A. P. Greenway. 24 Jul 67, 16p
Availability: Published in Zeitschrift fuer Vergleichende Physiologie, v56 p416-30 1967.

Descriptors: (*Fishes, *Photosensitivity (Biological)), Behavior, Photoreceptors, Intensity, Illumination, Motor reactions, Diurnal variations, Adaptation (Physiology), Belgium.
Identifiers: *Photokinesis.

Photokinesis as shown by the rapidly moving fish Danio malabaricus was examined in two experiments. In Experiment I, which involved sequences of short periods of light and darkness, the Ss for the most part showed a positive relationship between light intensity and level of activity. This reaction included a well differentiated response to abrupt intensity change, the effect of the transition from darkness to light being marked. Level of activity in both light and dark periods tended to fall; after a certain point, however, it rose again in the light but continued to fall in the darkness. In Experiment II, successive increases in the total area of lighted space available were matched by increases in the total length of time spent there by the Ss. The overall reaction, however, was initially photonegative and became more so as the experiment progressed. The range of most frequent periods of time spent in the lighted area increased gradually, while the length of entries into the shaded area gradually decreased, in the course of the ex-

periment. But for a lighted area the Ss' length of entry was shorter than for the corresponding dark area, the choice of period was more precise, there were fewer longer periods, and the range was less. In the last condition, the Ss divided their time approximately equally between the lighted 7/8 and the shaded 1/8 of the area available. The number of times the Ss crossed from one area to the other almost doubled during the experiment. (Author)
AD-666 853 Not available from CFSTI.

STUDIES ON THE TAXONOMY AND DISTRIBUTION OF SPHAGNUM IV,
National Research Council of Canada Halifax (Nova Scotia) Atlantic Regional Lab
W. S. G. Maass. 1967, 39p
NRC-9703
Availability: Published in Nova Hedwigia, v14 n2-4 p187-214 1967.

Descriptors: (*Plants (Botany), Morphology (Biology)), Distribution, Ecology, Identification, Classification, Nova Scotia.
Identifiers: Moss.

Sphagnum annulatum H. Lindb. ex Warnst. sensu lat. is shown to be a native of North America where it occurs in two varieties, var. annulatum (= S. annulatum H. Lindb. ex Warnst. sensu str. = S. jensenii H. Lindb. var. annulatum (H. Lindb. ex Warnst.) Warnst.) and var. porosum (Schlieph. and Warnst.) Maass and Isov. nova comb. (= S. jensenii H. Lindb.). Var. porosum is the common variety of S. annulatum and is found from subarctic Canada into Alaska and Wyoming whereas the typical variety, var. annulatum, is extremely rare and poorly understood. S. annulatum is compared with S. majus (= S. dusenii), S. mendocinum, and S. obtusum. An analysis of mixed populations of S. annulatum var. porosum and S. majus is included. A key is presented which concentrates on the diagnostic value of the pore development in the branch leaves. Comprehensive lists of specimens and maps, as well as camera lucida drawings and photographs are included. (Author)
AD-666 883 Not available from CFSTI.

BASELINE BLOOD VALUES OF THE CHIMPANZEE. II. THE RELATIONSHIP OF AGE AND SEX AND SERUM CHEMISTRY VALUES,
Aeromedical Research Lab (6571st) Holloman AFB N Mex
H. H. Hodson, Jr., W. G. Wisecup, M. F. Faulkner, and P. E. Felts. 1968, 13p
Availability: Published in Folia Primatologica, v8 n1 p77-86 1968.

Descriptors: (*Chimpanzees, *Blood chemistry), Aging (Physiology), Sex, Statistical analysis, Humans, Tables.

Limited studies have been reported on the serum chemistry values of the chimpanzee. Previous studies furnish minimal information concerning the relationship of age or sex and serum chemistry values. The report considers these relationships and affords other investigators, utilizing small numbers of chimpanzees, the opportunity to compare their findings with those from a relatively large population. Statistical analyses of 1935 serum chemistry determinations indicate that the serum chemistry values of the chimpanzee are, in general, similar to man. The serum potassium and, possibly, calcium levels are somewhat lower than the norm for man. There appears to be a decrease in serum urea nitrogen in the female chimpanzee with age and a decrease in serum total protein of the male animal at 80-100 months. Although there were variations in the serum electrolytes, CO2 and pH values which were correlated with the age of the chimpanzee in the present study, these variations were probably caused by excitement of the younger animal at the time the blood was drawn. (Author)
AD-666 984 Not available from CFSTI.

ECOLOGY OF MOLLUSCS AND THE CULTURE OF MYA ARENARIA,
General Dynamics Corp Groton Conn Electric Boat Div
For primary bibliographic entry see Field 8A.
AD-666 987 HC$3.00 MF$0.65

DISPLACEMENT ACTIVITIES AND AROUSAL,
Oxford Univ (England) Dept of Zoology
Juan D. Delius. Mar 68, 6p
AFOSR-68-0608
Grant AF-EOAR-12-66
Availability: Published in Nature, v214 n5094 p1259-60 Jun 17 1967.

Descriptors: (*Behavior, Animals), Motivation, Responses, Stimulation, Motor reactions, Electrophysiology, Sleep, Great Britain.

Although no binding rules exist by which displacement behaviour can be recognized, the term is applied to behaviour patterns which appear to be out of context with the behavior which closely precedes or follows them, either in the sense that they do not seem functionally integrated with the preceding or following behaviour or that they occur in situations in which causal factors usually responsible for them appear to be absent or at least weak compared with those determined the behavioural envelope. Displacement activities occur in three situations: motivational conflict, frustration of consummatory acts and physical thwarting of performance. Several theories have been put forward to explain the causal mechanism involved. A variety of behaviour patterns have been reported as displacement activities, even in a single species, but this variety needs revision. Monographic treatments of the behaviour of any one species usually indicate only two or three activities which according to the judgment of the observer occur commonly as displacement. None of the theories on displacement activities gives cogent reasons why particular behaviour patterns should be more common than others as displacement activities, apart from stating that the causal agents which usually elicit them in non-displacement situations can also be presumed to be present, if only weakly, in the displacement context, or remarking that these patterns are prepotent in the repertoire of the animal. (Author)
AD-667 012 Not available from CFSTI.

BODY FORM AND BEHAVIOURAL TYPES IN FISH,
Louvain Univ (Belgium) Laboratoire de Psychologie Animale
Philip Greenway. 1965, 11p
Availability: Published in Separatum Experientia, v21 p1-10 1965.

Descriptors: (*Fishes, *Behavior), Body, Motion, Motor reactions, Morphology (Biology), Sensory perception, Adaptation (Physiology), Swimming, Belgium.

In discussing the behavior of fish as related to body form, the following areas are considered: Geometric framework for the analysis of form; the relation of fins to form; typal forms; and body form and its relationship to speed of swimming.
AD-667 029 Not available from CFSTI.

MAN'S ROLE IN THE DISTRIBUTION OF THE COROZO PALM (ORBIGNYA SPP.),
California Univ Berkeley
Carl L. Johannessen. 1957, 5p
Contract Nonr-222 (11)
Availability: Published in Yearbook of the Association of Pacific Coat Geographers, v19 p29-33 1967.

Descriptors: (*Trees, Distribution), Plants (Botany), Ecology, Soils, Honduras, Mexico, Nicaragua, Guatemala, El Salvador.
Identifiers: Corozo palms.

Those interested in man's past and in his relationships to his environment receive satisfaction and even a certain exhilaration in finding sites of former human occupation. In some cases, vegetation may be an indicator of these sites. Some plants indicate habitation sites while others indicate areas disturbed by agricultural clearings. Such relationships have been observed in Central America in the case of the Corozo palm, and when groves are found they are worth looking into as possible indicators of nearby archeological sites. The Corozo palm (Orbignya cohune (Mart.) Dahlgren and O. guacuyule (Liebm. ex Mart.) H.X.) is widely distributed in Middle America. Areas where the Corozo palm may be found as one of the most numerous of the taller trees in the rain forest are shown on the map; much of this land has been cleared at sometime in the past and it appears that the abundance of the Corozo is probably related to such disturbances. Also indicated on the map are locations where the Corozo is more typically found in isolated groves. (Author)
AD-667 034 Not available from CFSTI.

DEFENSIVE BEHAVIOUR AND THE AFTER EFFECTS OF BRAIN STIMULATION IN THE RING DOVE (STREPTOPELIA RISORIA),
Oxford Univ (England) Inst of Experimental Psychology
For primary bibliographic entry see Field 5J.
AD-667 045 Not available from CFSTI.

Gm FACTORS IN NON-HUMAN PRIMATES.
California Univ San Francisco Medical Center
Erna Van Loghem, J. Shuster, and H. H. Fudenberg. 1968, 14p
Contract Nonr-3656 (12), Grant PHS-HE-05997
Prepared in cooperation with the Netherlands Red Cross Blood Transfusion Service, Amsterdam.
Availability: Published in Vox Sanguinis, v14 p81-94 1968.

Descriptors: (*Gamma globulin, Genetics), (*Primates, Gamma globulin), Antigens + antibodies, Immunology, Immune serums, Antigen-antibody reactions, Serodiagnosis, Morphology (Biology), Molecular structure.
Identifiers: Gm factors, Organic evolution.

Eighteen different primate species have been typed for Gm factors present at the human gamma 2b and gamma 2c loci. Gm factors are absent in lower primates. The Gm factors, associated with gamma 2c molecules, evolve first in the Cercopithecoidea species. Gm (z) occurs together with Gm (a) on human gamma 2b molecules, but in baboon sera Gm (z) occurs in the absence of Gm (a). The simultaneous occurrence of Gm (a) and (z) in the same sera is established in Hominoidea. Gm (b3) is present only in gorillas, orangutans, and chimpanzees, while Gm (b4) and (c3) were detected in chimpanzees. Polymorphism for the factors studied exists only in orangutans and chimpanzees. The data show a close correlation between taxonomic classification and the evolution of Gm factors. (Author)
AD-667 054 Not available from CFSTI.

HIGH RESOLUTION ELECTRON MICROSCOPY OF BIOLOGICAL SPECIMENS.
Chicago Univ., Ill. Dept. of Biophysics.
For primary bibliographic entry see Field 14B.
For abstract, see STAR 06 09.
N68-19222 HC$3.00 MF$0.65

ESTABLISHMENT OF ROADSIDE VEGETATION FOR ARIZONA HIGHWAYS.
Arizona Univ., Tucson. Dept. of Horticulture.
For primary bibliographic entry see Field 13B.
PB-177 036 HC$3.00 MF$0.65

DEER BROWSE RESOURCES OF THE ATOMIC ENERGY COMMISSION'S SAVANNAH RIVER PROJECT AREA.
Southeastern Forest Experiment Station, Asheville, N. C.

For primary bibliographic entry see Field 2F.
PB-177 685 HC$3.00 MF$0.65

A SIMPLE LYSIMETER FOR MEASURING THE LATENT HEAT TRANSFER FROM A VEGETATIVE COVER.
Missouri Univ., Columbia. Dept. of Soils.
For primary bibliographic entry see Field 2C.
PB-177 739 HC$3.00 MF$0.65

BASS,
National Science Foundation, Washington, D. C. Special Foreign Currency Science Information Program.
For primary bibliographic entry see Field 6H.
TT-67-58028 HC$3.00 MF$0.65

HAKE,
National Science Foundation, Washington, D. C. Special Foreign Currency Science Information Program.
For primary bibliographic entry see Field 6H.
TT-67-58031 HC$3.00 MF$0.65

MULLET,
National Science Foundation, Washington, D. C. Special Foreign Currency Science Information Program.
For primary bibliographic entry see Field 6H.
TT-67-58032 HC$3.00 MF$0.65

DENTEX,
National Science Foundation, Washington, D. C. Special Foreign Currency Science Information Program.
For primary bibliographic entry see Field 6H.
TT-67-58033 HC$3.00 MF$0.65

GILTHEAD,
National Science Foundation, Washington, D. C. Special Foreign Currency Science Information Program.
For primary bibliographic entry see Field 6H.
TT-67-58035 HC$3.00 MF$0.65

6D. Bionics

SOVIET CYBERNETICS: RECENT NEWS ITEMS, NO. 15,
Rand Corp Santa Monica Calif
Wade B. Holland. Mar 68, 73p Rept no. P-3600/15

Descriptors: (*Cybernetics, USSR), (*Computers, USSR), Reviews, Law, Libraries, Digital computers, Programming (Computers), Programming languages, Automation, Analog computers, Newspapers, Abstracts.
Identifiers: Translations.

The document reviews recent Soviet activity in computing technology and cybernetics.
AD-666 654 HC$3.00 MF$0.65

LEARNING THROUGH PATTERN RECOGNITION APPLIED TO A CLASS OF GAMES.
Case-Western Reserve Univ Cleveland Ohio Systems Research Center
For primary bibliographic entry see Field 9B.
AD-666 673 HC$3.00 MF$0.65

INTERNATIONAL CONFERENCE ON METHODOLOGIES OF PATTERN RECOGNITION JANUARY 24, 25, 26, 1968.
Hawaii Univ Honolulu East-West Center for Cultural Exchange
For primary bibliographic entry see Field 9D.
AD-666 679 HC$3.00 MF$0.65

DECOMPOSITION THEORY OF SEMIAUTOMATA AND AUTOMATA.
Stanford Research Inst Menlo Park Calif
For primary bibliographic entry see Field 9B.
AD-666 689 HC$3.00 MF$0.65

REGULAR EXPRESSIONS AND CHECKING EXPERIMENTS,
Polytechnic Inst of Brooklyn N Y Microwave Research Inst
For primary bibliographic entry see Field 9B.
AD-666 696 HC$3.00 MF$0.65

FOREIGN SCIENCE BULLETIN, VOL. 4, NO. 3, 1968.
Library of Congress Washington D C Aerospace Technology Div
For primary bibliographic entry see Field 20G.
AD-666 875 HC$3.00 MF$0.65

AN ADAPTIVE MULTICATEGORY PATTERN CLASSIFICATION SYSTEM.
Texas Univ Austin Labs for Electronics and Related Science Research
For primary bibliographic entry see Field 9D.
AD-666 898 HC$3.00 MF$0.65

ASYMPTOTICALLY OPTIMAL DISCRIMINANT FUNCTIONS FOR PATTERN RECOGNITION.
Texas Univ Austin Labs for Electronics and Related Science Research
For primary bibliographic entry see Field 12B.
AD-666 900 HC$3.00 MF$0.65

THE STATISTICAL AND COMPUTATIONAL ANALYSIS OF A SIMPLE LEARNING PROGRAM.
Technical rept. (Final),
Duke Univ Durham N C Medical Center
Max A. Woodbury. 1 Mar 67, 38p
AFOSR-68-0505
Grant AF-AFOSR-1180-66
Phase 1 of report on 'Informant Methodology Study.'

Descriptors: (*Learning machines, *Artificial intelligence), Feasibility studies, Simulation, Adaptive systems, Statistical analysis, Mathematical prediction.
Identifiers: Perceptron theory, Learning programs.

A scheme for making an adaptive predictor was based upon a variable linear combination of a large number of non-linear functions of the available predicting variables generated by the use of a pseudo-random numbers. This allowed a regeneration of the predictors computationally each time they were needed rather than relying on massive storage. Thus a small fast computer could be used in lieu of one with a large memory. The elementary analysis of the statistical properties of the 'perceptron-like' program (suggested by the random nature of the predictor generator) was undertaken and tested numerically with results which partially confirmed the analysis. Further statistical investigations of the process were then undertaken. The results of these indicate the efficiency of the predictor is quite good in some cases and relatively poor in others. This lead the way to later analysis to explore schemes which improve upon 'perceptron-like' predictors in those cases where the predictor efficiency is poor. These results will be reported on elsewhere. (Author)
AD-666 932 HC$3.00 MF$0.65

THE USE OF CONCEPTUAL RELATIONS IN CONTENT ANALYSIS AND DATA BASE STORAGE,
Tracor Inc Austin Tex
For primary bibliographic entry see Field 9B.
AD-666 992 HC$3.00 MF$0.65

RESEARCH ON THE UTILIZATION OF PATTERN RECOGNITION TECHNIQUES TO IDENTIFY AND CLASSIFY OBJECTS IN VIDEO DATA FINAL REPORT.
Douglas Aircraft Co., Inc., Newport Beach, Calif. Mar 68, 285p NASA-CR-999, SM-48464-F
Contract NAS12-30
Coll- 285 P Refs

Descriptors: *Pattern recognition, *Spacecraft electronic equipment, *Video data, Identifying, Image dissector tubes, Logic circuits, Photointerpretation, Scanning, Signal processing.

For abstract, see STAR 06 09.
N68-19229 HC$3.00 MF$0.65

6E. Clinical Medicine

THE ROLE OF THE CENTRAL NERVOUS SYSTEM IN SEPTIC SHOCK: II. HEMODYNAMIC, RESPIRATORY AND METABOLIC EFFECTS OF INTRACISTERNAL OR INTRAVENTRICULAR ENDOTOXIN,
Walter Reed Army Inst of Research Washington D C
Richard L. Simmons, Robert W. Anderson, Thomas B. Ducker, Kenneth Sleeman, and John A. Collins. Feb 68, 11p
Availability: Published in Annals of surgery, v167 n2 p157-67 Feb 1968.

Descriptors: (*Shock (Pathology), *Central nervous system), Toxins + antitoxins, Escherichia coli, Hematology, Respiration, Metabolism, Hyperventilation, Metabolic diseases, Blood pressure, Blood volume, Pulse rate, Blood plasma, Body fluids, Glucose, Blood.

The administration of relatively small doses of E. coli endotoxin into the lateral ventricles results in the death of dogs. The study documents hemodynamic, respiratory and metabolic alterations which follow the introduction of endotoxin into the central nervous system. Severe hyperventilation promptly follows CNS endotoxin and results in hypocarbia and respiratory alkalosis. An increase in arterial lactate levels minimizes the pH deviation in the presence of severe hypocarbia. Following a period of normal ventilation, hyperventilation returns and is followed by respiratory arrest. CNS endotoxin leads to a progressive gradual fall in cardiac output accompanied by a lesser fall in heart rate and arterial blood pressure. A later sharp rise in total peripheral resistance precedes death. Cardiovascular failure does not appear to be immediately responsible for death. No alterations in serum enzyme levels, coagulation screening tests, plasma volume or extracellular fluid volume could be detected. Blood glucose levels were elevated only for a short time in the first hour following endotoxin administration. The possible role of endotoxin acting on the central nervous system during systemic endotoxin shock is discussed. (Author)
AD-666 697 Not available from CFSTI.

SUBLINGUAL VENOGRAPHY: EVALUATION OF A NEW METHOD TO STUDY CERVICAL VENOUS AND SUPERIOR VENA CAVAL BLOOD FLOW. I. EXPERIMENTAL ANIMAL STUDIES,
Walter Reed Army Inst of Research Washington D C
Paul B. Jennings, Teruo Matsumoto, and Robert M. Hardaway. Jan 68, 13p
Availability: Published in Angiology, v19 n1 p36-47 1968.

Descriptors: (*Injection (Medicine), *Tongue), (*Contrast media, Injection (Medicine)), Veins, Diagnosis, Pathology, Blood circulation.

A new method of visualization of the cervical venous and superior vena caval systems is described, utilizing the sublingual veins for injection of contrast media. The positioning of the tongue and the

apparatus needed for injection have been discussed in detail. The method was utilized in dogs with experimental cervical and superior vena caval lesions. Preliminary studies involving subhuman primates were successful and suggest the clinical applications of the technique. (Author)
AD-666 699 Not available from CFSTI.

ANTIDIURETIC HORMONE RELEASE IN THE MONKEY DURING HYPO- AND HYPER-OSMOTIC DEHYDRATION.
Technical rept.,
Naval Medical Research Unit No 2 Taipei (Taiwan)
T. K. Young, and Robert A. Phillips. 1967, 7p
Rept no. NAMRU-2-TR-298
Availability: Published in Proceedings of the Society for Experimental Biology and Medicine, v125 p1174-6 1967.

Descriptors: (*Pituitary hormones, Secretion), (*Dehydration, Pituitary hormones), Osmotic pressure, Blood plasma, Shock (Pathology), Blood volume.
Identifiers: *Antidiuretic hormone.

Release of antidiuretic hormone in two types of dehydration was studied in monkeys. It was found that dehydration with high plasma osmolarity led to a tremendous elevation of plasma ADH level, and dehydration with low plasma osmolarity also led to a significant increase of plasma ADH level though less marked in degree. (Author)
AD-666 702 Not available from CFSTI.

AN EYE LESION IN RATS FED LOW CHROMIUM DIETS,
Walter Reed Army Inst of Research Washington D C
Edward E. Roginski, and Walter Mertz. 1967, 3p
Availability: Published in Journal of Nutrition, v93 n3 p249-51 Nov 1967.

Descriptors: (*Deficiency diseases, *Chromium), (*Eye, Pathology), Nutrition, Diet, Cornea, Proteins.

In the course of experiments with rats raised with a 10% soy protein ration, the occurrence of a corneal opacity was observed. The study was designed to determine whether this lesion is reproducible and whether it is related to the low chromium content of the diet (less than 100 ppb). Ten of 60 rats fed this ration without chromium supplement developed a pronounced opacity of the cornea and congestion of the iridal vessels. Supplementation of the drinking water with 2 ppm chromium prevented the appearance of the lesion, but did not cure the fully developed defect. The conjunctivae and the lens were not grossly affected. (Author)
AD-666 717 Not available from CFSTI.

THE IRON-STORAGE DISEASES,
Walter Reed Army Inst of Research Washington D C
Marcel E. Conrad. Jan 68, 5p
Availability: Published in Medical Annals of the District of Columbia, v37 n1 p15-9 Jan 68.

Descriptors: (*Iron, *Blood diseases), Absorption (Biological), Storage, Tissues (Biology), Anemias, Etiology, Biopsy, Therapy, Diagnosis.

Idiopathic, generalized, massive iron overloading (hemochromatosis) is a familial disorder in which excessive amounts of dietary iron are absorbed and accumulate in various organs of the body to produce tissue damage. Usually, the disease becomes manifest during the fourth to sixth decade of life as cirrhosis, diabetes mellitus, heart failure, or pigmentation of the skin. Hemochromatosis should be suspected in patients with any of these conditions and considered probable if 2 or more of this tetrad coexist. This probability is supported by an elevated serum iron which almost completely saturates the total iron-binding capacity. However, the diagnosis cannot be established with certainty until the massive and generalized nature of the iron overload is demonstrated in patients with normocytic, normochromic red blood cells who have no history of multiple blood transfusions or prolonged and excessive dietary intake of iron. Massiveness of iron overloading is demonstrated by tolerance to repeated phlebotomy; normal subjects develop iron-deficiency anemia following a loss of 2 to 5 liters of blood, whereas most hemochromatotics tolerate a 50 to 100 liter blood loss before they develop a sustained anemia with hypoferremia and depletion of iron from their tissue stores. Energetic phlebotomy should be undertaken to reduce excessive deposits in organs and prevent further tissue damage. (Author)
AD-666 718 Not available from CFSTI.

COOMBS'-POSITIVE HEMOLYTIC DISEASE IN MALARIA.
Walter Reed Army Inst of Research Washington D C
Marvin M. Adner, Leslie B. Altstatt, and Marcel E. Conrad. 12 Sep 67, 6p
Revision of report dated 17 Jul 67.
Availability: Published in Annals of Internal Medicine, v68 n1 p33-8 1968.

Descriptors: (*Plasmodium, Diseases), (*Hemolysis, *Parasitic diseases), Antimalarials, Cinchona alkaloids, Chemotherapeutic agents, Serodiagnosis, Military medicine, Resistance (Biological).
Identifiers: *Coombs test, *Malaria.

In a study of 131 soldiers evacuated from Vietnam with drug-resistant Plasmodium falciparum malaria, 4 patients were found with a positive direct antiglobulin test of the immunoglobulin (Ig) G type. In three patients the positive Coombs' tests seemed temporally related to the administration of quinine for relapsed malaria and were associated with hemolysis. Two of these patients had a quinine-related dermatitis, one developed blackwater fever within hours after the initiation of quinine therapy, and another had a panagglutinin in quinine-free red cell eluates. The fourth patient had compensated hemolysis and a positive direct Coombs' test which seemed unrelated to quinine therapy. The indirect Coombs' test was negative in all subjects, and no antiquinine antibodies were found in sera or red cell eluates from these patients. Coombs'-positive hemolytic disease is an unusual complication of malarial infections. Clinical observations in man suggest that quinine has a causal role in the hemolytic reaction. The mechanism by which this drug-induced hemolysis occurs is not known. (Author)
AD-666 719 Not available from CFSTI.

THE BIOLOGICAL ROLE OF CHROMIUM (III),
Walter Reed Army Inst of Research Washington D C
Walter Mertz. 1966, 4p
Availability: Published in Proceedings of the International Congress of Nutrition (7th), v5 Hamburg 1966 p689-92.

Descriptors: (*Deficiency diseases, *Chromium), Nutrition, Diet, Proteins, Glucose, Toxic tolerances, Insulin, Chromium compounds, Tissues (Biology), Metabolism, Humans.

The possibility that low-chromium states exist in some areas is discussed. Chromium is required for optimal glucose utilization, but its over-all effects reach further, for example into the field of protein metabolism. Low chromium states are related not only to diets low in protein and fat, but also to the consumption of highly refined food and, therefore, the problem may exist both in developing and developed countries. The demonstrated benefical effect and the virtual absence of toxicity of the microgram doses used, open a new possibility of improving our diets which, in some regions, may be deficient in chromium. (Author)
AD-666 720 Not available from CFSTI.

THE ROLE OF THE CENTRAL NERVOUS SYSTEM IN SEPTIC SHOCK: I. PATHOLOGIC CHANGES FOLLOWING INTRAVENTRICULAR AND INTRACISTERNAL ENDOTOXIN IN THE DOG,
Walter Reed Army Inst of Research Washington D C
Richard L. Simmons, Thomas B. Ducker, Arthur M. Martin, Jr., Robert W. Anderson, and Howard E. Noyes. Feb 68, 13p
Availability: Published in Annals of Surgery, v167 n2 p145-57 1968.

Descriptors: (*Shock (Pathology), *Central nervous system), Toxins + antitoxins, Septicemia, Injection (Medicine), Escherichia coli, Cerebrospinal fluid, Dosage, Pathology.

In order to define the possible contribution of CNS effects of endotoxin to endotoxin shock, small doses of E. coli endotoxin were introduced at various sites within the cerebrospinal fluid system. The relative efficacy of endotoxin in producing death depends on the proximity of the endotoxin to higher nervous centers. Less than one-fifth the intravenous dose was required when endotoxin was introduced into the lateral cerebral ventricles. CNS endotoxin does not exert its lethal effect by escaping into the vascular system. CNS endotoxin produced minimal microscopic congestion of the intestinal villi, subendocardial and intramyocardial hemorrhage, areas of micronecrosis of the myocardium, hemorrhage and edema of the mitral and tricuspid valves and a massive hemorrhagic pulmonary edema. These findings are compared with those found after the systemic administration of endotoxin. Only rare clinical neurologic deficits and no neuropathological lesions other than a minimal reactive meningitis or ependymitis at the site of injection could be found. Since the pathologic changes which appear after the injection of CNS endotoxin differ significantly from those which follow lethal intravenous endotoxin, it is concluded that systemic endotoxin does not act primarily through its influence on the CNS. However, the central nervous effects of endotoxin may well contribute to the evolution of endotoxin shock as well as to the systemic effects of intracranial infections. (Author)
AD-666 721 Not available from CFSTI.

VIENNA INTERNATIONAL SYMPOSIUM--TISSUE ADHESIVES IN SURGERY,
Walter Reed Army Inst of Research Washington D C
Teruo Matsumoto. Feb 68, 5p
Availability: Published in Archives of Surgery, v96 p226-30 Feb 68.

Descriptors: (*Surgical techniques, Adhesives), (*Adhesives, *Tissues (Biology)), Acrylic resins, Aerosols, Sprays, Toxicity, Wounds + injuries, Plastic surgery, Thorax, Urinary system, Symposia.
Identifiers: Monomers.

There are four major problems in the experimental work of tissue adhesives in surgery: (1) development of ideal adhesives; (2) selection of the best monomer among the presently available tissue adhesives; (3) method of application of the monomer; and (4) development of suitable surgical techniques. No ideal tissue adhesives are currently available. Development of biodegradable and less histotoxic adhesives are dependent on the knowledge of the chemists and their future efforts. At present, methyl 2-cyanoacrylate, n-butyl cyanoacrylate, and isobutyl cyanoacrylate have been studied. Although the higher homologous monomer was less histotoxic, methyl 2-cyanoacrylate was used successfully for reinforcement of suture techniques by many investigators. 'Aerosol tissue adhesive spray' simplified the method of application with a minimum amount of monomer in the given tissue surface. This may be considered to be an ideal method of application. Techniques for hemostasis of wounds in solid organs, anastomosis for tubular structures and cosmetic repair of skin incision were discussed. It was generally agreed

that these adhesives should be used more carefully in the clinical application under the selected indications. (Author)
AD-666 722 Not available from CFSTI.

PLAGUE OF VIETNAM 1965-1966,
Army Medical Research Team (Wrair) Vietnam San Francisco Calif 96307
J. D. Marshall, Jr., R. J. T. Joy, N. V. Ai, D. V. Quy, and J. L. Stockard. 1967, 14p
Availability: Published in American Journal of Epidemiology, v86 n3 p603-16 1967.

Descriptors: (*Pasteurella pestis, Diseases), (*Epidemiology, Vietnam), Infectious diseases, Rodents, Pest control, Public health, Diagnosis, Medical examination, Serodiagnosis, Antibiotics, Resistance (Biological), Immunity, Vaccines, Mortality rates.
Identifiers: *Plague.

Plague continues to be a significant public health problem in the Republic of Vietnam. During 1965, a total of at least 4,503 cases occurred. In the first six months of 1966, an additional 2,649 cases have been reported. The dramatic increase in number of cases reported in 1965-1966 as compared to the preceding four years is due in large part to a better reporting system initiated in 1965. The extension of the epidemic to the five northern provinces appears to be related to the transportation of grain from established foci. No antibiotic resistance for streptomycin, chloromycetin or the tetracyclines was noted in the 412 Pasteurella pestis strains isolated from humans during the last half of 1965 and the first six months of 1966. A single strain, isolated from a Rattus norvegicus, was resistant to 25 mcg of streptomycin. (Author)
AD-666 723 Not available from CFSTI.

TYPES AND DISTRIBUTION OF BACTERIAL ENTEROPATHOGENS ASSOCIATED WITH DIARRHEA IN VIETNAM.
Walter Reed Army Inst of Research Washington D C
Sidney Gaines, and Nguyen Thi Nhu-Tuan. Feb 68, 15p
Availability: Published in Military Medicine, v133 n2 p114-27 1968.

Descriptors: (*Military medicine, Enterobacteriaceae), (*Enterobacteriaceae, Vietnam), Diarrhea, Distribution, Antibiotics, Resistance (Biological), Vibrio, Cholera, Digestive system diseases, Salmonella, Shigella, Proteus, Pseudomonas, Escherichia coli.

Rectal swabs from 8,243 patients with diarrhea and 777 asymptomatic individuals (all Vietnamese) were examined during the period covered by this report. Of those with diarrhea, 3,591 (43.6%) were positive, and yielded 4,047 pathogenic isolates, while from the 139 (17.9%) of the asymptomatic individuals which were positive, 158 enteropathogens were cultured. V. cholerae isolations were the most frequent (almost half of all pathogenic isolates), and provided confirmation for the many clinical cases of the disease occurring during this time. Two asymptomatic subjects were found to harbor cholera vibrios. Of the other pathogens obtained, there were relatively few Salmonella, but Shigella species were the most frequently cultured of the non-vibrio isolates from patients of all ages. P. mirabilis and P. morganii were isolated relatively often from children with diarrhea, especially from infants. Enteropathogenic E. coli was found less often. The relatively frequent isolation of pathogens from asymptomatic individuals indicates that these organisms are widely distributed in the population, and emphasized the potential danger to susceptible contacts arriving in Vietnam. Except for V. cholerae strains, most of which were sensitive to the majority of antibiotics tested, there was a fairly high degree of resistance to the antibiotics among the other organisms. Neomycin and streptomycin were the most effective antibiotics. The widespread antibiotic resistance observed suggests the presence of transmissible drug resistance factors in this area. (Author)
AD-666 729 Not available from CFSTI.

MEASUREMENTS OF ORAL TEMPERATURE IN CHILDREN,
Office of the Surgeon General (Army) Washington D C
Glennadee A. Nichols. 1968, 3p
Availability: Published in The Journal of Pediatrics, v72 n2 p253-5 Feb 1968.

Descriptors: (*Body temperature, Measurement), Children, Thermometers, Accuracy, Medical examination.

Forty afebrile children had oral temperatures measured in an environmental temperature of 66 to 78 F. The optimum placement time which would adequately reflect the body temperature was 10 minutes. Boys required a longer time than girls to register their temperatures accurately, and children in the 10 to 12 year age group required slightly longer than those in the 7 to 9 age group. (Author)
AD-666 731 Not available from CFSTI.

WHOLE ORGAN FREEZING AND THAWING HEAT TRANSFER AND THERMAL PROPERTIES.
Quarterly progress rept. 1 Oct 67-1 Jan 68,
Geoscience Ltd La Jolla Calif
Heinz F. Poppendiek, Norman D. Greene, and Helen G. Gurgerson. 1 Jan 68, 10p Rept no. GLR-61
Contract Nonr-4095 (00)
See also AD-662 673.

Descriptors: (*Cryogenics, Tissues (Biology)), (*Tissues (Biology), *Freezing), (*Thermal conductivity, Tissues (Biology)), Heat transfer, Bovines, Heart, Kidneys, Brain, Liver, Temperature, Nitrogen, Liquefied gases, Thermal properties, Mathematical prediction.
Identifiers: Thawing.

The series of heat capacity measurements of various bovine tissues at liquid nitrogen temperatures were completed. The classical heat capacity equation for mixtures was used to predict the heat capacities of bovine muscle (heart), kidney, brain and liver. An experiment was performed to measure the heat release rate in simulated tissue material in which carbonyl iron powder was suspended. A high frequency induction field generated volumetric heat sources which would appreciably increase frozen tissue thaw rates. (Author)
AD-666 824 HC$3.00 MF$0.65

SCALING OF EXPERIMENTAL DATA ON CEREBRAL CONCUSSION IN SUB-HUMAN PRIMATES TO CONCUSSION THRESHOLD FOR MAN.
Research and development rept.,
Naval Ship Research and Development Center Washington D C Structural Mechanics Lab
Ayub K. Ommaya, Arthur E. Hirsch, Phil Yarnell, and Edward H. Harris. Dec 67, 11p
NSRDC-2640
Availability: Published in Paper presented at the Stapp Car Crash Conference (11th), Anaheim, Calif., Oct 10-11, 1967.

Descriptors: (*Head, Wounds + injuries), Crash injuries, Brain, Rotation, Primates, Mathematical prediction, Acceleration, Humans, Thresholds (Physiology), Shear stresses.
Identifiers: Concussion.

A method of extending the results of experiments on concussion-producing head rotations on lower primate subjects to predict the rotations required to produce concussions in man is presented. A rational scheme of development of the overall investigation is outlined. Theoretical scaling factors are derived and discussed and the results of concussion-producing tests on the Rhesus monkey are presented in chart form. A chart of angular acceleration required to produce concussion in the Rhesus monkey indicates that an acceleration of 40,000 radians per second sq will have a >99 percent probability of producing concussion. The scaling factors presented herein tentatively indicate that an acceleration of 7,500 radians per second sq will have the same probability of producing concussion in man. (Author)
AD-666 837 Not available from CFSTI.

PATHOGENESIS OF LETHAL SHOCK AFTER INTRAVENOUS STAPHYLOCOCCAL ENTEROTOXIN B IN MONKEYS,
Army Medical Unit Frederick Md
L. F. Hodoval, E. L. Morris, G. J. Crawley, and W. R. Beisel. 1968, 6p
Availability: Published in Applied Microbiology, v16 n2 p187-92 Feb 1968.

Descriptors: (*Shock (Pathology), Toxins + antitoxins), Staphylococcus, Septicemia, Dosage, Blood pressure, Oxygen, Cardiovascular system, Epinephrine, Parenteral infusions, Hypotension.

The pathogenesis of shock in the rhesus monkey given intravenous staphylococcal enterotoxin B (SEB) is not understood. Several cardiovascular changes produced by a highly purified preparation of SEB were studied after administration of doses ranging from 50 to 1,000 micrograms/kg. Irreversible arterial hypotension was found consistently at the higher doses. Arterial blood pressure and cardiac output declined substantially as shock developed. Total peripheral vascular resistance did not rise at any time, but showed a significant fall during the late stages of shock. Portal and central venous pressures remained essentially unchanged. Venous O2 content and pO2 declined gradually throughout the period of toxemia, but arterial O2 content remained constant until just prior to death, when a slight fall was noted in some monkeys. These changes were consistent with a pooling of blood in the peripheral vascular beds and seemed to resemble cardiovascular responses reported to occur in monkeys during shock due to bacterial endotoxin. Epinephrine, administered in the late stages of shock, caused arterial pressure to increase almost immediately and cardiac output to return to normal about 1 min later. Although life could occasionally be prolonged for several hours by continuous or intermittent epinephrine infusions, this therapy never succeeded in reversing the lethal effects of high doses of SEB. (Author)
AD-666 852 Not available from CFSTI.

FOREIGN SCIENCE BULLETIN, VOL. 4, NO. 3, 1968.
Library of Congress Washington D C Aerospace Technology Div
For primary bibliographic entry see Field 20G.
AD-666 875 HC$3.00 MF$0.65

AN EXPERIMENTAL STUDY OF REPLACEMENT SOLUTIONS IN HYPOVOLEMIC SHOCK,
Yale Univ New Haven Conn Dept of Surgery
Jean-E. Morin, and Ira S. Goldenberg. Oct 67, 7p
Contract Nonr-609 (10), Grant PHS-AM-02722
Availability: Published in Laval Medical, v38 n8 p744-9 Oct 1967.

Descriptors: (*Shock (Pathology), Therapy), Hemorrhage, Blood volume, Acidosis, Kidneys, Blood transfusions, Hematocrit, Blood chemistry, Urine, Vasoactive agents, Sodium compounds, Bicarbonates, Levarterenol.
Identifiers: Mannitol.

Simultaneous administration of equal volumes of 10 per cent mannitol solution and whole blood with added sodium bicarbonate was effective in reversing physiological alterations induced in a group of dogs by controlled hypovolemic shock. The vasopressor, levarterenol bitartrate, and the vasodilator, trimethephan camphorsulfonate, did little to restore measured parameters to normal

and probably have slight value in the treatment of hypovolemic shock. (Author)
AD-666 897 Not available from CFSTI.

THE IDENTIFICATION DILEMMA.
Aeromedical Reviews,
School of Aerospace Medicine Brooks AFB Tex
Albert C. Jerman, and John J. Tarsitano. Nov 67, 12p Rept no. Review-6-67

Descriptors: (*Teeth, Identification), Aviation accidents, Humans, Dentistry, Radiography.

One of the more reliable methods of proving positive identification of mutilated bodies is the use of the oral complex. There are two reasons why the teeth and surrounding structures are used for identification: (1) their relatively great resistance to destruction, and (2) the individuality of their components. A relatively new technic called a panoramic radiography may assist in the identification. Panoramic radiography is a simplified extraoral procedure which visualizes the entire maxillomandibular region in a single film. Panoramic radiography can be very useful in detecting fractures or other pathologic conditions. As valuable an aid as this technic is for living patients, it can be even more valuable in identification.
AD-666 903 HC$3.00 MF$0.65

VARIABILITY IN HUMAN PAROTID FLUID OSMOLALITY, SPECIFIC GRAVITY, AMYLASE, ACID PHOSPHATASE, AND GLUCOSE.
Rept. for 1 Mar-28 Apr 67,
School of Aerospace Medicine Brooks AFB Tex
Ira L. Shannon, and Vincent A. Segreto. Jan 68, 21p Rept no. SAM-TR-68-3

Descriptors: (*Saliva, Chemical analysis), Secretion, Sampling, Osmotic pressure, Glycoside hydrolases, Phosphoric monoester hydrolases, Glucose, Analysis of variance, Tolerances (Physiology).

One hundred parotid fluid samples were collected from each of 11 healthy young adult males. Collections were made five times daily, Monday through Friday, over a 4-week experimental period. Rate of flow was recorded and the measurements were made of osmolality, specific gravity, amylase, acid phosphatase, and glucose. Minute secretion rates were calculated for the chemical variables under test. Variations due to differences between subjects, times of day, days, weeks, and associated interactions were evaluated. Both between-subjects and within-subjects tolerance limits were computed to establish upper and lower bounds of anticipated subsequent samplings of these individuals. (Author)
AD-666 907 HC$3.00 MF$0.65

DEXAMETHASONE-INDUCED PITUITARY-ADRENAL SUPPRESSION AS MEASURED BY PAROTID FLUID STEROID LEVELS.
Rept. for May-Jul 66,
School of Aerospace Medicine Brooks AFB Tex
Robert L. Jenson, Ira L. Shannon, Marshall Sparberg, and Steven C. Beering. Dec 67, 11p Rept no. SAM-TR-67-117

Descriptors: (*Saliva, *Steroids), Pituitary gland, Adrenal cortex, Corticosteroid agents, Inhibition, Secretion.
Identifiers: Dexamethasone, Enemas.

Dexamethasone-21-phosphate (2 mg.) administered to healthy volunteers as a retention enema at 8:00 a.m. produced significant depression of serum and parotid fluid free 17-hydroxycorticosteroids by 3:00 p.m. Measurements of parotid fluid free 17-OHCS may be used to detect changes in adrenocortical function. Pituitary-adrenal suppression may occur after the use of intrarectal soluble adrenal corticosteroids. (Author)
AD-666 924 HC$3.00 MF$0.65

TIME-RELATED ADJUSTMENTS IN ACID-BASE STATUS OF EXTRACELLULAR AND INTRACELLULAR FLUID IN CHRONIC RESPIRATORY ACIDOSIS.
Kansas Univ Kansas City Dept of Physiology
For primary bibliographic entry see Field 6P.
AD-666 950 HC$3.00 MF$0.65

SUMMARIES OF RESEARCH 1967.
Naval Medical Research Unit No 4 Great Lakes Ill
Mar 68, 39p Rept no. NAMRU-4-68.4

Descriptors: (*Medical research, Reports), Naval research, Chemotherapeutic agents, Antibiotics, Neisseria meningitidis, Diseases, Streptococcus, Mycoplasma, Identification, Culture media, Immunity, Viruses, Vaccines, Antigens + antibodies, Mortality rates, Respiratory diseases, Poliomyelitis virus, Tissue culture, Electrophoresis, Gamma globulin, Allergy, Etiology, Epidemiology, Rubella, Military personnel, Influenza virus, Adenoviruses, Military medicine, Abstracts.
AD-666 976 HC$3.00 MF$0.65

A CYTOGENETIC STUDY OF 77 CHINESE CHILDREN WITH DOWN'S SYNDROME,
Naval Hospital Jacksonville Fla
S.-W. Huang, I. Emanuel, Judy Lo, S.-K. Liao, and C.-C. Hsu. Sep 67, 11p Rept no. NAMRU-2-TR-297
Availability: Published in Journal of Mental Deficiency Research, v11 Pt3 p147-52 Sep 1967.

Descriptors: (*Chromosomes, Anomalies), Cytology, Children, Aging (Physiology), Genetics, Mental disorders, Taiwan.
Identifiers: Down's syndrome.

Cytogenetic studies are reported for an unselected series of 77 Chinese children in Taiwan with Down's syndrome. Two had a D/G translocation (2.60 per cent), one of which was maternally inherited. One child (1.30 per cent) with a de novo G/G translocation had a sibling with a triple-X karyotype. Another child (1.30 per cent) had normal/trisomy G mosaicism, while the remaining 73 had trisomy G (94.81 per cent). These relative frequencies are within the ranges found for other ethnic groups in other countries. Maternal age of trisomy G cases in this series is markedly elevated compared to the related general population. (Author)
AD-666 997 Not available from CFSTI.

FURTHER STUDIES ON THE IMMUNOGENICITY OF D-AMINO ACID POLYMERS,
Weizmann Inst of Science Rehovoth (Israel) Section of Chemical Immunology
For primary bibliographic entry see Field 6A.
AD-667 035 Not available from CFSTI.

IMMUNOGENICITY OF HAPTEN CONJUGATES OF POLY-D-TYROSINE.
Weizmann Inst of Science Rehovoth (Israel) Section of Chemical Immunology
For primary bibliographic entry see Field 6A.
AD-667 036 Not available from CFSTI.

WHOLE SALIVA FLOW RATE AND PROTEOLYTIC ACTIVITY INDUCED BY AN ENZYME-CONTAINING CHEWING GUM.
School of Aerospace Medicine Brooks AFB Tex
For primary bibliographic entry see Field 6P.
AD-667 085 HC$3.00 MF$0.65

BURN-WOUND INFECTION WITH PHYCOMYCETES REQUIRING AMPUTATION OF HAND,
Brooke Army Medical Center Fort Sam Houston Tex Army Surgical Research Unit
F. Daniel Foley, and Jerry M. Shuck. 1968, 1p
Availability: Published in The Journal of The American Medical Association, v203 p596 Feb 19 1968.

Descriptors: (*Burns, Infections), Fungi, Hands, Necrosis, Chemotherapy, Pathology, Excision, Amputation stumps, Healing.
Identifiers: Phycomycetes.

A phycomycotic burn-wound infection of the fingers occurred in a severely burned patient. Extensive ischemic necrosis developed due to the tendency for this group of fungi to invade vessels, and amputation of the hand was required. An increase in fungal colonization of the burn wound has also been noted coincident with the use of topical chemotherapy. (Author)
AD-667 087 Not available from CFSTI.

PATHOLOGY OF THE LUNG IN FATALLY BURNED PATIENTS.
Brooke Army Medical Center Fort Sam Houston Tex Army Surgical Research Unit
F. Daniel Foley, John A. Moncrief, and Arthur D. Mason, Jr. Feb 68, 14p
Availability: Published in Annals of Surgery, v167 n2 p251-64 1968.

Descriptors: (*Burns, Pathology), (*Lungs, Pathology), Biopsy, Histology, Infections, Septicemia, Mortality rates, Respiratory diseases, Edema, Trachea, Cannulation, Face.

A clinicopathological examination of 233 autopsies was performed to analyze the frequency of fatal complications following cutaneous thermal injury with particular reference to pulmonary complications. Over a 6-year period, the major fatal complication in burned patients treated at the Surgical Research Unit has shifted from invasive burn wound infection to pneumonia. The decline in burn wound infection has been due to effective topical chemotherapy. The recent increase in deaths attributed to pneumonia is considered real in patients over 15 years of age and results from the greater frequency of infective lower respiratory disease found clinically. A part of the increase in deaths attributed to pneumonia may be due to effects of earlier and more prolonged ventilatory assistance and oxygen therapy. Although inhalational injury occurs, experience indicates that the majority of laryngeal and tracheal lesions found at autopsy are due to repeated trauma from tracheostomies or endotracheal tubes. Respiratory complications occur more frequently in patients with facial burns, but the presence of facial burns alone does not constitute a particular hazard to the burned patient. The increased incidence of respiratory complications in patients with facial burns may be due to the increased occurrence of facial burns in severely burned patients who are more susceptible to infective lower respiratory disease. Respiratory complications in less severely burned patients with facial burns have not occurred. (Author)
AD-667 088 Not available from CFSTI.

USE OF SYNTHETIC POLYPEPTIDES IN STUDIES ON THE CONTROL OF ANTIBODY FORMATION.
Weizmann Inst of Science Rehovoth (Israel) Section of Chemical Immunology
For primary bibliographic entry see Field 6A.
AD-667 093 Not available from CFSTI.

STUDY OF THE EFFECTS OF ADDITIONAL ENDOGENOUS HEAT.
Annual technical progress rept.
Thermo Electron Engineering Corp., Waltham, Mass.
Dec 67, 402p Rept. no. 4064-25-68
Contract PH-43-66-982
Prepared in cooperation with Children's Hospital Medical Center, Boston, Mass. See also PB-176 914.

Descriptors: (*Medical research, Cardiovascular system), (*Heat transfer, Physiology), Laboratory animals, Heating elements, Instrumentation, Blood circulation, Heart, Tolerances (Physiology), Experimental data, Heat exchangers, Power supply, Implants, Mathematical analysis.

The report covers a year of work performed to study the effects of additional endogenous heat on a living circulatory system. The purpose of the program is to determine the feasibility of using circulating blood as a heat-transfer medium to dissipate waste heat from an implanted power supply for a circulating support device. All major aspects of the problem - physiologic, hematologic and pathologic - are evaluated. Boundary conditions of heat input, heat-flux density, and surface and bulk temperature which can be tolerated by the blood, parenchymatous organs and other tissue are evaluated on both an acute and a chronic basis. (Author)
PB-177 753 HC$3.00 MF$0.65

6F. Environmental Biology

JUNGLE VISION III. EFFECTS OF SEASONAL VARIATION ON PERSONNEL DETECTION IN AN EVERGREEN RAINFOREST.
Research rept.,
Army Tropic Test Center, Fort Clayton (Canal Zone).
D. A. Dobbins, M. Gast, and C. M. Kindick. May 65, 45p RR-3
See also research rept. no. 8, AD-649 843.

Descriptors: (*Military personnel, Detection), (*Humans, Detection), Vision, Target recognition, Optical images, Climatology, Jungles, Illumination, Performance (Human), Forestry, Rain, Surface targets, Plants (Botany), Tropical regions, Periodic variations.
Identifiers: Vegetation.

The study was conducted to determine whether there are sufficient changes in evergreen rainforest vegetation during the dry season to enable us soldiers to detect human targets more readily than is possible during the wet season. The determination was made by comparing the results of the present study with a similar one conducted at the same sites during the wet season. Eighteen U.S. infantry soldiers, all with normal vision, each were presented 45 randomly appearing human targets dressed in standard army field clothes. The observers, who had a 180 degrees field of search, attempted to detect each target and estimate the distance to the target. Noise arresters were used to eliminate auditory cues. In spite of higher illumination levels, observable qualitative changes in vegetation, and a severe dry season, there were no significant differences in target detectability between the two seasons. In fact, the results of the present study could have been predicted from the previous study. Reliability of the methodology is indicated by the reproducibility of results. The near limit of target detectability in an evergreen rainforest was between 100 and 115 feet. Eye-level vegetation appears to be the principal deterrent to target detection regardless of the season. (Author)
AD-468 749 HC$3.00 MF$0.65

ARTHROPODS OF MEDICAL IMPORTANCE IN LATIN AMERICA. PART II. ARTHROPODS OTHER THAN MOSQUITOES.
Technical rept.,
New York State Coll of Agriculture Ithaca
B. V. Travis, and Renato M. Labadan. Dec 67, 280p
USA-NLABS-TR-68-30-ES-PT-2, ES-35-Pt-2
Contract DA 19-129-AMC-417 (N)
See also Part 1, AD-666 761.

Descriptors: (*Arthropods, Latin America), Tables, Classification, Distribution, Ecology, Disease vectors, Diseases, Bites + stings, Behavior, Diptera, Military medicine, Insects, Larvae, Siphonaptera, Mites, Ticks, Reproduction (Physiology).
Identifiers: Flies, Fleas, Bugs.

The groups of arthropods included, with the number of species or subspecies in parentheses, are: black flies (275), sand flies (204), midges (178), horse flies (1,115), biting flies (3), non-biting flies (24), fleas (356), bugs (70), urticating and vesicating arthropods (25), ticks (182), mites (73), and miscellaneous arthropods (35). (Author)
AD-666 757 HC$3.00 MF$0.65

ARTHROPODS OF MEDICAL IMPORTANCE IN LATIN AMERICA. PART I. INTRODUCTORY AND EXPLANATORY MATERIAL DATA ON MOSQUITOES.
Technical rept.,
New York State Coll of Agriculture Ithaca
B. V. Travis, and Renato M. Labadan. Dec 67, 237p
USA-NLABS-TR-68-30-ES-Pt-1, ES-35-Pt-1
Contract DA-19-129-AMC-417 (N)
See also Part 2, AD-666 757.

Descriptors: (*Arthropods, Latin America), (*Culicidae, Ecology), Tables, Classification, Distribution, Reproduction (Physiology), Disease vectors, Diseases, Behavior, Military medicine, Bites + stings.
Identifiers: Mosquitoes.

The occurrence of insects and other arthropods of medical importance in South and Middle America, the West Indies, Bermuda and the Falklands, and lands within the Antarctic Circle is summarized on the basis of a compilation of almost all available references in the scientific literature. The report includes, for each major group of arthropods, a listing of species and subspecies with biological and distributional data, tabulations of diseases or disease organisms transmitted, and complete literature citations. (Author)
AD-666 761 HC$3.00 MF$0.65

CBE FACTORS: MONTHLY SURVEY NO. 22.
Library of Congress Washington D C Aerospace Technology Div
For primary bibliographic entry see Field 15B.
AD-666 991 HC$3.00 MF$0.65

ESTABLISHMENT OF ROADSIDE VEGETATION FOR ARIZONA HIGHWAYS.
Arizona Univ., Tucson. Dept. of Horticulture.
For primary bibliographic entry see Field 13B.
PB-177 036 HC$3.00 MF$0.65

DEER BROWSE RESOURCES OF THE ATOMIC ENERGY COMMISSION'S SAVANNAH RIVER PROJECT AREA.
Southeastern Forest Experiment Station, Asheville, N. C.
For primary bibliographic entry see Field 2F.
PB-177 685 HC$3.00 MF$0.65

SPIDER CRAB,
National Science Foundation, Washington, D. C. Special Foreign Currency Science Information Program.
For primary bibliographic entry see Field 6B.
TT-67-58034 HC$3.00 MF$0.65

6G. Escape, Rescue, and Survival

AEROMEDICAL ASPECTS OF HELICOPTER OPERATIONS IN THE TACTICAL SITUATION.
Advisory Group for Aerospace Research and Development, Paris (France).
May 67, 279p AGARD-CP-24
Lang- in English and French Conf- Proc. of Agard Aerospace Med. Panel Symp., Paris, 22-24 May 1967

Descriptors: *Helicopters, *Medical services, *Rescue operations, Casualties, Conferences, Evacuating (transportation), Helicopter performance, Human factors engineering, Ice formation, Medical personnel, Safety factors.

For abstract, see STAR 06 09.
N68-19325 HC$3.00 MF$0.65

6H. Food

BITE-SIZE FOOD IN FIGHTER AIRCRAFT.
Final rept. Aug 66-May 67,
School of Aerospace Medicine Brooks AFB Tex
May J. O'Hara, and John E. Vanderveen. Dec 67, 15p Rept no. SAM-TR-67-114

Descriptors: (*Food dispensing, Jet fighters), Pilots, Nutrition, Acceptability, Handling, Ingestion (Physiology), Taste, Space medicine.
Identifiers: F-100 aircraft.

Bite-size foods were consumed by pilots of fighter-type aircraft in two trials, and data were collected on the acceptability and ease of handling these foods. This type of feeding system offers foods that are stable without refrigeration, are easy to handle, and need no kitchen facility for preparation. Bite-size food flavors at the present time do not surpass those of conventional foods. (Author)
AD-666 909 HC$3.00 MF$0.65

BASS,
National Science Foundation, Washington, D. C. Special Foreign Currency Science Information Program.
Josip Basioli. 1966, 13p SFCSI-Int (TT-67-58028)
Trans. of Morsko Ribarstvo (Yugoslavia) v18 n1/2 p22-3 1966, tr. by Karmela Vlahovic.

Descriptors: (*Fishes, Yugoslavia), Reproduction, Commerce, Ingestion (Physiology), Costs, Production, Distribution, Environment, Acceptability.
Identifiers: *Fisheries, Dicentarchus labrax.

A general survey is given of sport and commercial fishing activities involving the sea bass (Dicentarchus labrax) in Yugoslavia.
TT-67-58028 HC$3.00 MF$0.65

HAKE,
National Science Foundation, Washington, D. C. Special Foreign Currency Science Information Program.
Josip Basioli. 1968, 11p SFCSI-Int (TT-67-58031)
Trans. of Morsko Ribarstvo (Yugoslavia) v17 n9/10 p182-4 1965, tr. by Karmela Vlahovic.

Descriptors: (*Fishes, Yugoslavia), Environment, Distribution, Production, Commerce, Ingestion (Physiology), Weight, Culture, Acceptability, Reproduction.
Identifiers: Merlucius merlucius, *Fisheries.

A general survey is given of the Yugoslav hake (Merlucius merlucius) Fishery industry.
TT-67-58031 HC$3.00 MF$0.65

MULLET,
National Science Foundation, Washington, D. C. Special Foreign Currency Science Information Program.
Josip Basioli. 1967, 11p SFCSI-Int (TT-67-58032)
Trans. of Morsko Ribarstvo (Yugoslavia) v17 n5/6 p97-9 1965, tr. by Karmela Vlahovic.

Descriptors: (*Fishes, Yugoslavia), Environment, Distribution, Production, Ecology, Culture, Weight, Costs, Law, Commerce, Natural history, Life cycle, Reproduction, Acceptability, Ingestion (Physiology).
Identifiers: *Fisheries, Mullus barbatus, Mullus surmuletus.

A general survey is given of commercial fisheries activities involving the European red mullet (Mullus barbatus) and the striped mullet (Mullus surmuletus) in Yugoslavia.
TT-67-58032 HC$3.00 MF$0.65

DENTEX,
National Science Foundation, Washington, D. C. Special Foreign Currency Science Information Program.
Josip Basioli. 1967. 13p SFCSI-Int (TT-67-58033)
Trans. of Morsko Ribarstvo (Yugoslavia) v17 n11/12 p214-7 1965, tr. by Karmela Vlahovic.

Descriptors: (*Fishes, Yugoslavia), Law, Distribution, Production, Environment, Preservation, Reproduction, Handling, Ingestion (Physiology).
Identifiers: Dentex gibbosus, *Fisheries.

A general survey is given of sport and commercial fishing activity involving Dentex gibbosus cocco in Yugoslavia.
TT-67-58033 HC$3.00 MF$0.65

GILTHEAD,
National Science Foundation, Washington, D. C. Special Foreign Currency Science Information Program.
Josip Basioli. 1968. 11p SFCSI-Int (TT-67-58035)
Trans. of Morsko Ribarstvo (Yugoslavia) v18 n3/4 p67-70 1966, tr. by Karmela Vlahovic.

Descriptors: (*Fishes, Yugoslavia), History, Environment, Weight, Ingestion (Physiology), Production, Acceptability.
Identifiers: *Fisheries, Chrysophrys aurata.

A general survey is given of sport and commercial fishing activities involving the gilthead (Chrysophrys aurata) in Yugoslavia.
TT-67-58035 HC$3.00 MF$0.65

6K. Life Support

SIX-CHANNEL READOUT FOR A CHROMATOGRAPHIC ANALYSIS OF SPACE-CABIN ATMOSPHERE.
Final rept.,
Melpar Inc Falls Church Va
Stanley F. Muzidal, and John C. Mould. 29 Feb 64, 45p
Contract AF 41 (609)-1976

Descriptors: (*Controlled atmospheres, Gas chromatography), (*Gas chromatography, *Display systems), Spacecraft cabins, Space simulation chambers, Instrumentation, Design, Construction, Monitors, Digital recording systems, Gas analysis.
Identifiers: Readout systems.

The report documents the design and construction of a six-channel readout system. The equipment is intended as a laboratory tool for monitoring the atmosphere of a simulated aerospace cabin. The system indicates (in mm of mercury) the partial pressures of nitrogen, oxygen, carbon monoxide, carbon dioxide, and water vapor, as well as the total pressure of the cabin atmosphere. A manifold containing the water-vapor pressure and total pressure transducers is provided as an accessory to the readout system. Visual presentation of the various parameters indicative of the cabin atmosphere is available on a Nixie tube diplay and also in printed form. Identical information is simultaneously available from an analog output capable of driving a pen recorder, and a digital output to operate a paper tape punch. An operation and maintenance manual is available as AD-666 693. (Author)
AD-666 692 HC$3.00 MF$0.65

OPERATION AND MAINTENANCE MANUAL SIX-CHANNEL READOUT FOR A CHROMATOGRAPHIC ANALYSIS FOR SPACE CABIN ATMOSPHERES.
Final rept.,
Melpar Inc Falls Church Va
Stanley F. Muzidal, and John C. Mould. Feb 64, 159p
Contract AF 41 (609)-1976

Descriptors: (*Controlled atmospheres, Gas chromatography), (*Gas chromatography, *Display systems), Spacecraft cabins, Space simulation chambers, Gas analysis, Instrumentation, Monitors, Digital recording systems, Installation, Calibration, Operation, Maintenance, Instruction manuals.
Identifiers: Readout systems.

The manual is comprised of installation, operation, troubleshooting, and maintenance procedures for the readout system described in AD-666 692.
AD-666 693 HC$3.00 MF$0.65

WATER RECLAMATION AND CONSERVATION IN A CLOSED ECOLOGICAL SYSTEM.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
V. G. Collins, and D. C. Popma. 1966, 19p
NASA-TM-X-57247
Conf- Presented At the Ecol. Technol. Symp., Washington, D. C., 14-15 Feb. 1966

Descriptors: *Closed ecological systems, *Manned space flight, *Water reclamation, Distillation equipment, Electrodialysis, Human wastes, Metabolic wastes, Oxygen production, Spacecraft environments, Water treatment.

For abstract, see STAR 06 09.
N68-18863 HC$3.00 MF$0.65

6L. Medical and Hospital Equipment

MONKEY PERFORMANCE TESTING APPARATUS (MAZE),
Armed Forces Radiobiology Research Inst Bethesda Md
S. J. Kaplan, and H. D. Cooper. Nov 67, 27p
Rept no. AFRRI-TN67-1

Descriptors: (*Behavior, Radiation effects), (*Radiation effects, Test equipment), Laboratory equipment, Automatic, Psychomotor tests, Data processing systems, Radiological dosage, Programming (Computers), Psychophysiology.

A description is presented of a special performance testing device, the Kaplan-AFRRI Maze (KAM), designed for studying radiation effects upon the monkey. The structure and functions of this automated maze are provided. The material covered in this report also includes the environmental chamber for the KAM, manual and automatic operation, programming for automatic control, the data acquisition system and the data processing procedures. (Author)
AD-666 643 HC$3.00 MF$0.65

6M. Microbiology

COMPARATIVE BIOSYNTHESIS OF ORNITHINE AND LYSINE BY MYCOPLASMA AND L FORMS,
South Dakota Univ Vermillion Dept of Microbiology
Paul F. Smith. 12 Mar 66, 6p
Contract Nonr-4898 (00)
Availability: Published in Journal of Bacteriology, v92 n1 p164-9 Jul 1966.

Descriptors: (*Mycoplasma, Classification), (*Amino acids, Biosynthesis), Yeasts, Metabolism, Enzymes, Culture media, Glutamic acid.
Identifiers: Ornithine, Lysines.

Seven species of Mycoplasma, two L forms not requiring salt and their parent bacteria, and two yeasts were examined for enzymes involved in the biosynthesis of ornithine and lysine. All organisms tested, except two species of Mycoplasma and the yeasts, decarboxylated meso-alpha, epsilon-diaminopimelic acid. None of the Mycoplasma species or L forms was capable either of reducing alpha-aminoadipic acid to its semialdehyde or of incorporating alpha-aminoadipic acid-6-C14 into lysine. All organisms, except the yeasts and Mycoplasma sp. caprine strain 14, acetylated glutamic acid, and all organisms possessed N alpha-acetyl-L-ornithine:2-oxo-glutarate amino-transferase activity. N alpha-acetylornithase activity was negligible in all organisms except Proteus and its L form. No transacetylation between acetylglutamic acid and ornithine, and vice versa, was demonstrable in any of the organisms. Mycoplasma species appear to possess the bacterial pathway to lysine. Ornithine does not appear to arise from glutamic acid. (Author)
AD-666 637 Not available from CFSTI.

PLAGUE OF VIETNAM 1965-1966,
Army Medical Research Team (Wrair) Vietnam San Francisco Calif 96307
For primary bibliographic entry see Field 6E.
AD-666 723 Not available from CFSTI.

TYPES AND DISTRIBUTION OF BACTERIAL ENTEROPATHOGENS ASSOCIATED WITH DIARRHEA IN VIETNAM.
Walter Reed Army Inst of Research Washington D C
For primary bibliographic entry see Field 6E.
AD-666 729 Not available from CFSTI.

FRAGMENTATION OF GUINEA PIG COMPLEMENT COMPONENTS C'2 AND C'3c,
Johns Hopkins Univ Baltimore Md Dept of Microbiology
For primary bibliographic entry see Field 6A.
AD-666 734 Not available from CFSTI.

ARBOVIRUS STUDIES IN SAO PAULO, BRAZIL.
Annual rept. no. 2, Nov 66-Jan 67,
Instituto Adolfo Lutz Sao Paulo (Brazil) Laboratorio de Arbovirus
Oscar de Souza Lopes. Jan 67, 15p
Grant DAHC19-67-G-0010

Descriptors: (*Arboviruses, Epidemiology), Disease vectors, Collecting methods, Classification, Identification, Culicidae, Immune serums, Serodiagnosis, Birds, Mammals, Tables, Data.

Collections of birds, animals, and human sera were studied, isolating and screening the viruses detected. A few new, or new isolations in the study area were sent to the Yale Arbovirus Laboratory for final identification or characterization. Isolations were also made from pooled mosquitos collected in the forest, outside of houses, and inside of houses. Continued difficulty was experienced in obtaining specimens from ill inhabitants reticent to report illness. Evidence continues to indicate transmission from forest reservoirs into houses by wild mosquitoes. Five tables of data are included. (Author)
AD-666 807 HC$3.00 MF$0.65

PATHOGENESIS OF LETHAL SHOCK AFTER INTRAVENOUS STAPHYLOCOCCAL ENTEROTOXIN B IN MONKEYS,
Army Medical Unit Frederick Md
For primary bibliographic entry see Field 6E.
AD-666 852 Not available from CFSTI.

MORPHOMETRIC ANALYSIS OF YEAST CELLS. II. CELL SIZE OF SCHIZOSACCHAROMYCES POMBE DURING THE GROWTH CYCLE,
National Research Council of Canada Ottawa (Ontario)

B. F. Johnson. 6 Mar 67. 10p Rept no. NRC-9647
Availability: Published in Experimental Cell Research, v49 p59-68 1968.

Descriptors: (*Sacchromyces, Growth), Cells (Biology), Morphology (Biology), Culture media, Cell division, Cell structure, Canada.

The growth cycle of cultures of Schizosaccharomyces pombe is characterized by the usual lag, log and stationary phases. The mean cell size of the population of yeast cells changes in a consistent manner through the growth cycle. When cultures are inoculated with stationary cells, there is through the lag phase a predominantly exponential rate of cellular extension. This observation constitutes further evidence suggesting that the extension of S. pombe ordinarily increases exponentially through the cell cycle. The mean cell size is greatest at the transition between the lag and log phases. In fact the range is displaced, as immature cells through most of the log phase are larger than immature cells at the beginning of the stationary phase. The mean cell size decreases exponentially through the log phase, and the amount of glucan per cell changes proportionally with the decrease in cell size. In addition, the cell-plate index falls constantly through the log phase, presumbly indicating that the cell cycle itself changes through the log phase. All of these observations indicate the unbalanced nature of growth of this yeast in culture. These and similar observations (by others) on a large number of other microorganisms suggest that unbalanced growth is a common phenomenon. (Author)
AD-666 882 Not available from CFSTI.

SUMMARIES OF RESEARCH 1967.
Naval Medical Research Unit No 4 Great Lakes Ill
For primary bibliographic entry see Field 6E.
AD-666 976 HC$3.00 MF$0.65

CBE FACTORS: MONTHLY SURVEY NO. 22.
Library of Congress Washington D C Aerospace Technology Div
For primary bibliographic entry see Field 15B.
AD-666 991 HC$3.00 MF$0.65

PROPERTIES OF BACTERIA ISOLATED FROM DEEP-SEA SEDIMENTS,
Georgetown Univ Washington D C Dept of Biology
M. M. Quigley, and R. R. Colwell. Jan 68. 11p
Contract Nonr-4810 (00)
Availability: Published in Journal of Bacteriology, v95 n1 p211-20 1968.

Descriptors: (*Marine biology, Bacteria), Sedimentation, Ocean bottom sampling, Sea water, Morphology (Biology), Pseudomonas, Identification, Deep water, Pacific Ocean.
Identifiers: Aeromonas.

Thirty-eight isolates were subjected to taxonomic analysis by computer. Of the 38 isolates, 31 were from sediment samples collected at depths from 9,400 to 10,400 meters in the Philippine and Marianas Trenches of the Pacific Ocean, and 7 cultures were from seawater samples collected at various depths from surface to 4,000 meters and from several locations in the Pacific Ocean. A total of 116 characteristics were determined for each isolate, coded, and transferred to punch cards. Similarity values were obtained by computer analysis, with the use of two recently developed computer programs. Five distinct phenetic clusters were observed from the numerical analyses. Four of the clusters were identified as species of the genus Pseudomonas, and one, as an aerogenic species of Aeromonas. Group IV was identified as pigmented Pseudomonas fluorescens, and the major cluster, consisting of groups I and II, which merged at a species level of similarity, was treated as a new species of Pseudomonas. The 38 strain data were compared with data for 132 marine and nonmarine strains previously subjected to computer taxonomic analysis. The barotolerant deep-sea strains, with the exception of the deep-sea P. fluorescens isolates, clustered separately from all other marine strains. (Author)
AD-667 064 Not available from CFSTI.

STUDIES ON TRACE ELEMENTS IN THE SPORULATION OF BACTERIA AND THE GERMINATION OF BACTERIAL SPORES FINAL REPORT, JUN. 1964 - DEC. 1967.
Syracuse Univ., N. Y. Dept. of Bacteriology and Botany.
R. A. Slepecky. 1967. 9p NASA-CR-93684
Grant NSG-693

Descriptors: *Bacteria, *Germination, *Spores, *Trace elements, Chemical analysis, Elution, Enzyme activity, Metals.

For abstract, see STAR 06 09.
N68-19322 HC$3.00 MF$0.65

SYSTEMATIC DESCRIPTION AND KEY TO ISOLANTS FROM LITTLE LAKE VOLCANIC AREA, CALIFORNIA PROGRESS REPORT.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. Oregon State Univ., Corvallis.
F. Au, W. B. Bollen, and K. M. Byers. 1 Dec 67. 30p NASA-CR-93671
Contr ts NAS7-100, JPL-950783
Prep- prepared for Jpl

Descriptors: *Bacteria, *California, Charts, Culture techniques, Morphology, Staining.

For abstract, see STAR 06 09.
N68-19335 HC$3.00 MF$0.65

60. Pharmacology

EFFECT OF D-TUBOCURARINE ON THE SCALING OF EFFORT OF ISOMETRIC MUSCLE CONTRACTIONS.
Progress rept.,
Army Medical Research Lab Fort Knox Ky
Richard P. Smith, Lee S. Caldwell, and Donald M. Thomas. 7 Feb 68. 13p Rept no. USAMRL-765

Descriptors: (*Curare alkaloids, *Psychophysiology), Strength, Perception (Psychology), Muscles, Contraction, Fatigue (Physiology), Sensation (Physiology), Endurance.

The purpose of this study was to determine whether the alteration in voluntary strength produced by d-tubocurarine, and the consequent reduction in feedback from the muscles, would distort a subject's normal reference for judging the effortfulness of a task, and change the slope of the effort function. The effort function obtained with d-tubocurarine was not significantly different from those secured in the normal and placebo conditions. Thus, it was concluded that the motor units remaining functional after the administration of d-tubocurarine fatigue normally, and that the slope of the effort function is determined by the relative rather than the absolute number of motor units required to maintain the contraction. (Author)
AD-666 749 HC$3.00 MF$0.65

DEXAMETHASONE-INDUCED PITUITARY-ADRENAL SUPPRESSION AS MEASURED BY PAROTID FLUID STEROID LEVELS.
School of Aerospace Medicine Brooks AFB Tex
For primary bibliographic entry see Field 6E.
AD-666 924 HC$3.00 MF$0.65

REGULATION OF LIPID TRANSPORT AND DEPOSITION: EFFECTS OF NICOTONIC ACID.
Milan Univ (Italy) Inst of Pharmacology
For primary bibliographic entry see Field 6P.
AD-666 926 HC$3.00 MF$0.65

CBE FACTORS: MONTHLY SURVEY NO. 22.
Library of Congress Washington D C Aerospace Technology Div
For primary bibliographic entry see Field 15B.
AD-666 991 HC$3.00 MF$0.65

SELECTIVE PROTECTION OF 5-HYDROXYTRYPTAMINE STORES AGAINST THE ACTION OF RESERPINE BY TREATMENT WITH 5-HYDROXYTRYPTOPHAN,
Goteborg Univ (Sweden) Dept of Pharmacology
Arvid Carlsson. Mar 68. 5p
AFOSR-68-0605
Grant AF-EOAR-36-67
Availability: Published in Journal of Pharmacy and Pharmacology v19 p783-4 Nov 1967.

Descriptors: (*Reserpine, inhibition), (*Serotonin, Brain), Protection, Tryptophan, Tyrosine, Dosage, Pharmacology.
Identifiers: Catecholamines.

It was observed that repeated injections of 5-hydroxytryptophan (5-HTP), given to mice shortly before and after reserpine, will protect 5-HT stores against the action of this alkaloid, while the catecholamine stores are left unprotected. Thus, 24 hr after the injection of reserpine (3 mg/kg, i.p.) the brains of the 5-HTP-treated animals still contained about 60% of the normal 5-HT level, compared to 20% in the controls treated with reserpine alone. The catecholamine levels were about 10% of normal irrespective of 5-HTP treatment. If animals protected with 5-HTP as described above received a second injection of reserpine after 24 hr, the 5-HT level was rapidly reduced from about 60 to 20%. Further, it was found that animals given 5-HTP in the same dosage but no reserpine, had normal brain 5-HT levels after 24 hr. (Author)
AD-667 027 Not available from CFSTI.

METABOLIC PATHWAYS OF DOPAMINE AND NOREPINEPHRINE IN RABBIT BRAIN IN VITRO,
Goteborg Univ (Sweden) Dept of Pharmacology
For primary bibliographic entry see Field 6P.
AD-667 057 Not available from CFSTI.

THE INTERFERENCE OF TETRABENAZINE, BENZQUINAMIDE AND PRENYLAMINE WITH THE ACTION OF RESERPINE,
Goteborg Univ (Sweden) Dept of Pharmacology
Arvid Carlsson, and Margit Lindqvist. Mar 68. 11p
AFOSR-68-0603
Grant AF-EOAR-56-65
Availability: Published in Acta Pharmacologica et Toxicologica, v24 p112-20 1966.

Descriptors: (*Amines, Brain), (*Reserpine, Pharmacology), Injection (Medicine), Heart, Levarterenol, Serotonin, Granules, Storage, Behavior, Drugs, Sweden.
Identifiers: Aminoethyl pyrocatechols, Tetrabenazine, Benzquinamide, Prenylamine.

Mice and rabbits were treated with tetrabenazine, benzquinamide or prenylamine shortly before an injection of reserpine. After 24 hours the animals were killed, and the brains and hearts were analysed for monoamines. Tetrabenazine and prenylamine partially protected the animals against the action of reserpine on gross behaviour and brain monoamine levels (dopamine, noradrenaline and 5-HT), indicating that these two drugs compete with reserpine for the same site of attack in the amine storage granules. Benzquinamide enhanced the effects of reserpine on behavior and on brain catecholamine levels. The mechanisms of this effect is obscure. (Author)
AD-667 131 Not available from CFSTI.

TRANSPORT OF BIOLOGICAL AMINES AS AN ELEMENT OF DRUG ACTION,
Goteborg Univ (Sweden) Dept of Pharmacology
For primary bibliographic entry see Field 6P.
AD-667 133 Not available from CFSTI.

6P. Physiology

THE EFFECT OF TREADMILL GRADE ON PERFORMANCE DECREMENT USING A TITRATION SCHEDULE,
Army Medical Research Lab., Fort Knox, Ky.
For primary bibliographic entry see Field 5J.
AD-275 974 HC$3.00

EFFECT OF PCO2 ON THE RELATION OF LACTATE AND EXCESS LACTATE TO O2 DEFICIT.
School of Aerospace Medicine Brooks AFB Tex
For primary bibliographic entry see Field 6S.
AD-666 647 HC$3.00 MF$0.65

MATHEMATICAL MODELS FOR THE ANALYSIS OF THE NITROGEN WASHOUT CURVE.
Technical rept. Jul 63-Jan 67,
School of Aerospace Medicine Brooks AFB Tex
Robert G. Rossing, M. Bryan Danford, Earl L. Bell, and Raul Garcia. Nov 67, 63p Rept no. SAM-TR-67-100

Descriptors: (*Respiration, Mathematical models), Nitrogen, Lungs, Distribution functions, Oxygen.
Identifiers: *Nitrogen washout.

A general mathematical description of the washout of nitrogen from the lung during oxygen breathing is developed. From this, several specific mathematical models are derived and compared. These models each involve one of three different variables for description of the washout process: the alveolar dilution ratio, the specific tidal volume, or the rate constant. Two different types of models are considered: one involves a discrete distribution function of the basic variable; the other, a continuous distribution function. Several such models are applied to a series of washout curves as test problems. They are all found to be capable of fitting such curves with approximately equal precision. The choice between them must, therefore, be based on other factors such as theoretical suitability and ease of interpretation. On the basis of these criteria, the model suggested is one in which the alveolar dilution ratio manifests a Normal distribution, either unimodal or bimodal. Methods are developed for the calculation of certain indices from the parameters of this model. These indices may be of value in evaluating intersubject comparisons as well as intrasubject comparisons over time. Finally it is shown that these same indices may be calculated directly from the raw data, independent of any postulated distribution model. (Author)
AD-666 651 HC$3.00 MF$0.65

NEUROPHYSIOLOGICAL MECHANISMS OF THE STATES OF SLEEP.
Final scientific rept. Oct 66-Oct 67,
Lyon Univ (France) Dept of Experimental Medicine
Michel Jouvet. Oct 67, 20p
AFOSR-68-0523
Grant AF-EOAR-46-66
Availability: Published in Unidentified journal.

Descriptors: (*Sleep, Electrophysiology), Serotonin, Levarterenol, Brain, Nerve cells, Central nervous system, Drugs, Electroencephalography.
Identifiers: Raphe system.

The destruction of the Raphe System in chronically registered cats produce a state of permanent insomnia and a decrease of cerebral serotonin whereas there is no change of cerebral noradrenalin. There is a significant correlation between the extent of the destruction of the Raphe System, the intensity and duration of insomnia and the decrease of cerebral serotonin. These findings agree with the results of neuropharmacological experiments which show that the depletion of cerebral serotonin by P.Chlorophenylalanine induce also a state of insomnia in chronic cats whereas the secondary injection of 5.Hydroxytryptophan is able to induce normal sleep. The Raphe System, where most of serotonin containing neurons are located, appears to be a major sleep inducing structure, and cerebral serotonin seem to play a determinant role in the active process underlying sleep. (Author)
AD-666 672 Not available from CFSTI.

SYNAPTIC TRANSMISSION AND ITS RELATION TO SURFACE CHEMISTRY OF NERVE CELLS.
Scientific rept. (Final), 1 Nov 66-31 Jan 68,
University Coll London (England) Dept of Biophysics
Rafael Elul. 15 Feb 68, 22p
AFOSR-68-0525
Contract F61052-67-C-0021
Prepared in cooperation with California Univ., Los Angeles. Space Biology Lab.

Descriptors: (*Neuromuscular transmission, Electrophysiology), Muscles, Nerve impulses, Responses, Contraction, Nerve cells, Regeneration, Membranes (Biology), Cerebral cortex, Electroencephalography, Sleep, Nerve fibers, Biophysics, Great Britain.

Research was conducted on two problems: (1) In the frog, certain muscles normally contain slow as well as fast muscle fibers, and exhibit a composite mechanical response. It was found following denervation of these muscles and during nerve regeneration that the sustained component of the mechanical response disappears, without appreciable change in the fast component. Further experiments revealed that this transformation is not related to the transmission of nervous impulses across the neuromuscular junction. Also, electron microscopy of transformed muscles reveals slow muscle fibers in normal proportion, and with intact internal (fibrillar) structure. Accordingly it is concluded that a 'humoral' or 'trophic' agent released by the degenerating or regenerating nerve is capable of modification of membrane structure of slow muscle fibers in the frog to prevent excitation and the ensuing mechanical contraction. (2) In the cerebral cortex of the cat, analysis was performed of the 'equivalent dipole length' of the dipoles formed between current sources and sinks on cortical neurons. Because synapses on these cells act as current sources, and the circuit is closed through passive membrane, presumably around the axon hillock, this approach gives an indication of the localization of synapses relative to the axon hillock and the cell body. Dipoles of 0.5 - 2.5 mm pole separation were found in the waking animal. During sleep pole separation increased to 1.0 - 4.0 mm. It was also found that different components of visual evoked potentials are generated by synapses at significantly different locations on the neuron. (Author)
AD-666 694 HC$3.00 MF$0.65

PHYSIOLOGICAL CHARACTERISTICS OF CHILDREN,
Foreign Technology Div Wright-Patterson AFB Ohio
S. I. Galperin. 22 Sep 67, 309p Rept no. FTD-HT-67-184
Edited trans. of mono. Fiziologicheskie Osobennosti Detei, Moscow, 1965 243p.

Descriptors: (*Physiology, *Children), Humans, Physical fitness, Growth, Anthropometry, Hygiene, Anatomy, Nervous system, Reflexes, Exercise, Aging (Physiology).
Identifiers: Translations.

Age physiology is an important component of the curriculum on human physiology. This report presents basic patterns and facts on the structure and functions of the body of school age children. Particular attention is paid to the physiological basis of consciousness, unity of the higher neural activity, and the psyche.
AD-666 716 HC$3.00 MF$0.65

AN EYE LESION IN RATS FED LOW CHROMIUM DIETS,
Walter Reed Army Inst of Research Washington D C
For primary bibliographic entry see Field 6E.
AD-666 717 Not available from CFSTI.

THE BIOLOGICAL ROLE OF CHROMIUM (III),
Walter Reed Army Inst of Research Washington D C
For primary bibliographic entry see Field 6E.
AD-666 720 Not available from CFSTI.

EFFECT OF D-TUBOCURARINE ON THE SCALING OF EFFORT OF ISOMETRIC MUSCLE CONTRACTIONS.
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 6O.
AD-666 749 HC$3.00 MF$0.65

EFFECTS OF SLEEP DEPRIVATION ON THE VESTIBULO-OCULAR REFLEX.
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 6S.
AD-666 750 HC$3.00 MF$0.65

WHOLE ORGAN FREEZING AND THAWING HEAT TRANSFER AND THERMAL PROPERTIES.
Geoscience Ltd La Jolla Calif
For primary bibliographic entry see Field 6E.
AD-666 824 HC$3.00 MF$0.65

DETERMINING INSULIN LEVELS USING INSULIN I 125 AND INSULIN-BINDING REAGENT.
Rept. for Apr-Aug 67,
School of Aerospace Medicine Brooks AFB Tex
James F. Green. Dec 67, 13p Rept no. SAM-TR-67-111

Descriptors: (*Insulin, Tracer studies), Diagnosis, Glucose, Toxic tolerances, Radioactive isotopes, Sensitivity, Carbohydrates, Metabolism, Immunology.

A procedure for the immunoassay of insulin levels using insulin I 125 as a tracer was evaluated to study parameters of reproducibility, accuracy of values, sensitivity with changes in fasting times, temperature effects, and recovery. On the basis of the evaluation, the method is considered to be appropriate as a routine diagnostic test for fasting insulin levels. The usefulness of this procedure for measurement of insulin levels through the course of a standard glucose test has yet to be evaluated. Future study should involve evaluation of the concept of free and bound insulin, determining which insulin this system measures, and the relationship of free to bound insulin during both fasting and glucose tolerance conditions in normal individuals. (Author)
AD-666 908 HC$3.00 MF$0.65

REGULATION OF LIPID TRANSPORT AND DEPOSITION: EFFECTS OF NICOTONIC ACID.
Technical rept. 1 Oct 63-31 Oct 66,
Milan Univ (Italy) Inst of Pharmacology
R. Paoletti. Feb 68, 19p
SAM-TR-68-5
Contract AF 61 (052)-736

Descriptors: (*Metabolism, Nicotinic acid), (*Lipids, Metabolism), Glucose, Fatty acids, Adrenal glands, Levarterenol, Blood chemistry, Body temperature, Adipose tissue, Cold weather tests, Exposure, Hormones, Biosynthesis, Italy.

The effects of nicotinic acid on lipid transport were studied in two series of experiments. In the first, nicotinic acid was administered to normal and adreno-demedullated rats exposed to cold. Results showed that nicotinic acid specifically blocked free fatty acid mobilization during cold exposure without altering glucose mobilization. In the second series of experiments, measurements were made of the incorporation of C 14 into triglyceride by epididymal fat pads using C 14-glucose as substrate. Results showed that nicotinic acid did not

increase utilization of glucose for triglyceride synthesis in fat pads from fed rats except when norepinephrine was present. In fat pads from fasted rats, nicotinic acid increased incorporation of C 14 from glucose into triglyceride, but epinephrine decreased that incorporation. These facts are discussed in relation to the interrelationships of hormones, glucose, and nicotinic acid on fat synthesis and mobilization from peripheral tissues. (Author)
AD-666 926 HC$3.00 MF$0.65

TECHNIQUES AND MATERIALS FOR PASSIVE THERMAL CONTROL OF RIGID AND FLEXIBLE EXTRAVEHICULAR SPACE ENCLOSURES.
Final rept. Feb 66-May 67,
Little (Arthur D) Inc Cambridge Mass
David L. Richardson. Dec 67, 113p
AMRL-TR-67-128
Contract AF 33 (615)-3533

Descriptors: (*Pressure suits, *Extravehicular activity), (*Temperature control, Pressure suits), Performance (Human), Passive, Thermal insulation, Cooling, Underwear, Heat transfer, Work functions, Venting, Thermal analysis, Mathematical analysis, Control systems.

The results of the analysis indicate that when an astronaut in a flexible enclosure (soft space suit) works on the surface of a large spacecraft, the temperatures on his external surface are markedly increased over those which occur when he is not near the spacecraft. Moreover, passive thermal control of the astronaut is not possible when he is near the spacecraft. The techniques investigated for thermally coupling an astronaut with his thermal control system include liquid cobled undergarments, gas cooling, and heat transfer to the cooled walls of his enclosure. Techniques were investigated for increasing the conductance through soft space suit insulations by compressing the insulation. The insulation of a cylindrical section of a space suit arm was measured under both compressed conditions (3.7 psia) and uncompressed conditions in simulated noon and earth-umbra orbit-positions. The range of conductance increased from 0.26 Btu/sq ft-hr degrees F uncompressed to 0.81 Btu/sq ft-hr degree F compressed. Measurements were made in simulated noon and earth-umbra orbit positions of the thermal heat dissipating capability of a louver system which was designed for operation in the sun. A 6-inch square model had a net heat flow from the louvers for the four orbit conditions tested (open and closed in the sun and in the shade). The louver operation controls maintained the louver baseplate temperature in the range from 73.9 to 84.7 F for a steady heat dissipation rate of 95.5 Btu/sq ft-hr while operating in the shade. (Author)
AD-666 940 HC$3.00 MF$0.65

TIME-RELATED ADJUSTMENTS IN ACID-BASE STATUS OF EXTRACELLULAR AND INTRACELLULAR FLUID IN CHRONIC RESPIRATORY ACIDOSIS.
Interim rept. Jan 66-Aug 67,
Kansas Univ Kansas City Dept of Physiology
Edward D. Martin, Franklin L. Scamman, Benjamin A. Attebery, and E. B. Brown, Jr. Dec 67, 14p
SAM-TR-67-116
Contract AF-41 (609)-3005

Descriptors: (*Acid-base equilibrium, Body fluids), Acidosis, Respiration, Carbon dioxide, pH, Muscles, Heart, Brain, Liver, Blood analysis, Bicarbonates, Buffers.

Rats were kept in an environmental chamber in which normal oxygen pressure was maintained but in which the CO2 fraction of environmental air was 10%. From 9 to 14 animals were removed at frequent intervals during the first 36 hours and daily thereafter for 6 days in order to follow the time-related adjustments in acid-base status of extracellular and intracellular fluid in chronic respiratory acidosis. Intracellular ped from the distribution of C 14-5,5-dimethyl-2,4-oxazolidinedione (DMO) in skeletal muscle, heart, brain, and liver. Blood pH and PCO2 were measured in arterial samples drawn quickly from anesthetized animals. Extracellular water was estimated from the chloride space using Cl 36. Results indicated that skeletal muscle and extracellular fluid are buffered to nearly the same degree but that heart is better buffered and that brain was the best buffered tissue examined. Intracellular fluid of all tissue accommodated to chronic respiratory acidosis by an increase in bicarbonate, which was complete between 24 to 48 hours. This was about the same time that extracellular bicarbonate reached a new plateau value. (Author)
AD-666 950 HC$3.00 MF$0.65

AUDITORY RESPONSES OF NEURONES IN THE LATERAL MESENCEPHALIC NUCLEUS (INFERIOR COLLICULUS) OF THE BARBARY DOVE,
Oxford Univ (England) Inst of Experimental Psychology
Marguerite Biederman-Thorson. Mar 68, 13p
AFOSR-68-0607
Grant AF-EOAR-12-66
Availability: Published in J. Physiol., v193 p695-705 1967.

Descriptors: (*Auditory perception, Electrophysiology), Auditory signals, Responses, Nerve cells, Birds, Inhibition, Stimulation, Nerve impulses, Great Britain.

Auditory responses have been recorded from forty-five single neurones in the lateral mesencephalic nucleus of the dove, confirming the suspected auditory function of this nucleus. Most of the neurones with sustained responses to tones fell into three response-categories: inhibitory only, excitatory in a central range of frequencies with inhibition in adjacent frequency regions, and predominantly inhibitory with one or more relatively small excitatory regions. Seven of the neurones studied showed only transient responses: these had high thresholds or were restricted to a narrow range of frequencies. Responses to clicks were sometimes obtained, but were variable in different units and in a single unit were often dependent on repetition rate. Many properties of these neurones are similar to those in the cat inferior colliculus. The most notable difference is the existence in the dove of neurones with exclusively or predominantly inhibitory responses. (Author)
AD-667 002 Not available from CFSTI.

METABOLIC PATHWAYS OF DOPAMINE AND NOREPINEPHRINE IN RABBIT BRAIN IN VITRO,
Goteborg Univ (Sweden) Dept of Pharmacology
Charles O. Rutledge, and Jan Jonason. Mar 68, 12p
AFOSR-68-0604
Grant AF-EOAR-36-67
Availability: Published in The Journal of Pharmacology and Experimental Therapeutics, v157 n3 p493-502 1967.

Descriptors: (*Amines, Metabolism), Brain, Levarterenol, Oxidoreductases, Transferases, Amosage, Enzyme inhibitors, Biosynthesis, In vitro analysis, Sweden.
Identifiers: Aminoethyl pyrocatechols.

In rabbit cerebral cortex slices, dopamine was deaminated to the two phenolic acids, 3,4,-dihydroxyphenylacetic acid and homoyanillic acid, whereas norepinephrine was deaminated primarily to the two phenolic glycols, 3-methoxy-4-hydroxyphenylglycol and 3,4-dihydroxyphenylglycol. Only negligible amounts of 3-methoxy-4-hydroxyphenylethanol and 3,4-dihydroxyphenylethanol could be detected after incubation with dopamine. No normetanephrine could be detected from newly formed norepinephrine but considerable quantities of normetanephrine were isolated from exogenously added norepinephrine. This observation was taken as support for the view that newly formed norepinephrine is initially catabolized by intraneuronal monoamine oxidase and subsequently by extra-neuronal catechol-O-methyl-transferase, whereas exogenously added norepinephrine can be catabolized initially by either enzyme. Pretreatment of rabbits with the monoamine oxidase inhibitor nialamide reduced the deaminated catabolites of both norepinephrine and dopamine to negligible quantities. Nialamide pretreatment also produced a 6-fold increase in methoxytyramine after incubation with dopamine and a 1.5-fold increase in normetanephrine after incubation with norepinephrine. Increasing doses of nialamide increased the net synthesis of norepinephrine. The total synthesis of norepinephrine (norepinephrine plus catabolites) was also increased with the largest dose of nialamide employed, 100 mg/kg. (Author)
AD-667 057 Not available from CFSTI.

WHOLE SALIVA FLOW RATE AND PROTEOLYTIC ACTIVITY INDUCED BY AN ENZYME-CONTAINING CHEWING GUM.
Rept. for 1 Feb-31 Mar 67,
School of Aerospace Medicine Brooks AFB Tex
Ira L. Shannon, and Vincent A. Segreto. Dec 67, 13p Rept no. SAM-TR-67-118

Descriptors: (*Saliva, Secretion), (*Enzymes, Saliva), Peptide hydrolases, Mastication, Dentistry.
Identifiers: Chewing gum.

To learn the effect of enzyme chewing gum on flow rate and proteolytic enzyme content of the oral fluid, 1,980 whole saliva samples were collected from 120 healthy young adult males. The test gum produced a rate of flow of 1.442 ml./min., this mean not differing significantly from that of 1.381 ml./min. produced by the sugar-containing control gum. Peak rate of flow is found in the first 5-minute sample collected with fresh gum, either test or control, and a rapid decrease in flow rate ensues as the ingredients of the gum are dissolved into the saliva and removed from the mouth. Tremendous increases in salivary protease levels are induced by chewing the test gum. The enzyme gum was capble of maintaining a significantly increased salivary protease level for approximately two hours after a fresh stick was introduced. The peak protease level is found in the first 5-minute sample; subsequent decrease is precipitous. At 15 minutes after the initial collection, the protease mean fell to 16.9% of the peak level. (Author)
AD-667 085 HC$3.00 MF$0.65

ELASTICITY OF SOFT TISSUES IN SIMPLE ELONGATION,
California Univ San Diego La Jolla Dept of the Aerospace and Mechanical Engineering Sciences
Y. C. B. Fung. 19 Mar 68, 15p
AFOSR-68-0640
Grant AF-AFOSR-1186-67
Availability: Published in American Journal of Physiology, v213 n6 p1532-44 Dec 1967.

Descriptors: (*Tissues (Biology), Elasticity), Deformation, Tensile properties, Stresses, Strain (Mechanics), Biophysics, Equations.

Elasticity of living soft tissues is strongly nonlinear. Based on experimental results on rabbits' mesentery, a theoretical framework is presented in which the elastic properties of soft tissues can be described. It is shown that the mathematical formulation works well also in reducing published data on the series element of the heart and striated muscles and the skin. In simple elongation the tensile stress is nearly an exponential function of the strain in the lower stress range. Based on this fact, it is shown that although we are dealing with the finite deformation of highly nonlinear materials, the elastic property of soft tissues in tension can be expressed quite simply in most cases. It is necessary, however, to give up the usual practice of trying to characterize the elasticity of a tissue by a representative Young's modulus, because this modulus varies over a very wide range, which is often zero at vanishing stress, and increases linearly as the stress increases, and therefore is meaning-

less unless the exact stress level is specified. New physical constants recommended are: the slope and curvature at the origin of the curve of dT/d lambda vs. T, where T stands for tension and lambda stands for the extension ratio, and the tensile stress T, (based on the original cross-sectional area) at a specific value of the extension ratio lambda. (Author)
AD-667 125 Not available from CFSTI.

THE INTERFERENCE OF TETRABENAZINE, BENZQUINAMIDE AND PRENYLAMINE WITH THE ACTION OF RESERPINE,
Goteborg Univ (Sweden) Dept of Pharmacology
For primary bibliographic entry see Field 6O.
AD-667 131 Not available from CFSTI.

TRANSPORT OF BIOLOGICAL AMINES AS AN ELEMENT OF DRUG ACTION,
Goteborg Univ (Sweden) Dept of Pharmacology
A. Carlsson. Mar 68, 5p
AFOSR-68-0602
Grant AF-EOAR-56-65
Proceedings of the Symposium on Biophysics and Physiology of Biological Transport Frascati, June 1965, Springer-Verlag/Wien-New York.
Availability: Published in Protoplasma, v68 n1-3 p123-5.

Descriptors: (*Amines, *Nerve cells), Autonomic nervous system, Transport properties, Storage, Permeability, Adenosine phosphates, Granules, Oxidoreductases, Enzyme inhibitors, Secretion, Adrenal glands, Sweden.

The concept of a dual amine-concentrating mechanism, first proposed two years ago, has contributed greatly to the elucidation of the physiology and pharmacology of amine-storing cells. These cells may prove interesting model systems for the study of biological transport mechanisms. (Author)
AD-667 133 Not available from CFSTI.

STUDIES OF CIRCADIAN CYCLES IN HUMAN SUBJECTS DURING PROLONGED ISOLATION IN A CONSTANT ENVIRONMENT USING EIGHT-CHANNEL TELEMETRY SYSTEMS.
Naval Submarine Medical Center, Groton, Conn. Physiological Sciences Div.
B. R. Clagg, and K. E. Schaefer. 1966, 15p
NASA-CR-74032
NASA ORDER R-24
Conf- Presented At Natl. Telemetry Conf., Boston, 10-12 May 1966

Descriptors: *Biotelemetry, *Circadian rhythms, *Confinement, *Human body, *Physiological responses, Aerospace medicine, Biological effects, Electrophysiology, Environmental tests, Social isolation.

For abstract, see STAR 06 09.
N68-19137 HC$3.00 MF$0.65

INFLUENCE OF EAST-WEST AND RETURN TRIPS ON THE CIRCADIAN RHYTHMS OF DIURESIS AND URINARY ELIMINATION OF SODIUM AND POTASSIUM.
Influence des Voyages Aeriens Est-ouest Et Vice Versa Sur les Rythmes Circadiens de La Diurese Et de l'Elimination Urinaire Du Sodium Et Du Potassium
National Aeronautics and Space Administration, Washington, D. C.
E. La Fontaine, J. La Vernhe, J. Pasquet, and J. Sirot. Mar 68, 9p NASA-TT-F-11621
Tran- Transl. Into English From Rev. de Med. Aeron. Et Spatiale, V. 6, No. 23, 1967 P 11-15

Descriptors: *Circadian rhythms, *Diuresis, *Urinalysis, Activity cycles (biology), Body fluids, Diurnal variations, Potassium, Sodium, Urination.

For abstract, see STAR 06 09.
N68-19487 HC$3.00 MF$0.65

6Q. Protective Equipment

SEALED INSULATED MILITARY BOOTS.
Army Natick Labs Mass Clothing and Organic Materials Lab
For primary bibliographic entry see Field 15E.
AD-666 752 HC$3.00 MF$0.65

DIRECT MOLDED SOLE BOOTS.
Army Natick Labs Mass Clothing and Organic Materials Lab
For primary bibliographic entry see Field 15E.
AD-666 756 HC$3.00 MF$0.65

6R. Radiobiology

MONKEY PERFORMANCE TESTING APPARATUS (MAZE),
Armed Forces Radiobiology Research Inst Bethesda Md
For primary bibliographic entry see Field 6L.
AD-666 643 HC$3.00 MF$0.65

USE OF CHROMOSOME ABERRATIONS TO ESTIMATE X-RAY AND GAMMA-RAY DOSE TO MAN.
Technical rept. Sep 65-Aug 66,
California Univ Los Angeles School of Medicine
Amos Norman, Masao S. Sasaki, Richard E. Ottoman, and Robert C. Veomett. Dec 67, 24p
SAM-TR-67-112
Contract AF 41 (609)-2944
Continuation of contracts AF 41 (657)-391 and AF 41 (609)-1909.

Descriptors: (*Radiobiology, Chromosomes), (*Chromosomes, Anomalies), Radiological dosage, X rays, Gamma rays, Lymphocytes, Radiation effects, Sampling, Culture media.

The frequency of chromosome aberrations in lymphocytes taken from the peripheral blood provides a useful measure of absorbed dose. The estimation of dose is affected by time in culture of the lymphocytes, by sampling error and sampling time, and by size, rate, distribution, and quality of radiation dose. Data on the effect of these variables are presented. Dose is estimated for five people accidentally exposed to ionizing radiation. Four appendixes give a detailed account of optimal technics for making chromosome preparations, the yields of aberrations as a function of dose in 50-hour and 72-hour cultures, and the yield of acentric fragments per dicentric. (Author)
AD-666 713 HC$3.00 MF$0.65

EFFECT OF GAMMA IRRADIATION ON SERUM ISOENZYME SYSTEMS.
Final rept. 1 May 66-30 Apr 67,
IIT Research Inst Chicago Ill
William H. Blair. 27 Jun 67, 65p Rept no. IITRI-L6036-5
Contract AF 41 (609)-3135

Descriptors: (*Radiation effects, *Enzymes), Radiological dosage, Gamma rays, Dose rate, Electrophoresis, Histology, Radiobiology, Hemoglobin.

The objective of this program was to study serum LDH isoenzyme alterations after subacute irradiation with primates. These alterations were to be related to dose in order to relate the minimum dose necessary to produce significant LDH isoenzyme changes. The doses studied were 200, 300, and 500 rads at a dose rate of 20 rads/min. Blood was collected, and the clear supernatent was analyzed by electrophoresis and histochemical staining for LDH isoenzymes. The isoenzyme change and the altered ratio were calculated and related to dose of irradiation received. It has been established that the band 1-to-band 2 ratio should be 1.0-to-2.5. Values above or below this range are considered abnormal. Depression of the 1-to-2 ratio that lasted 72 hr was seen at 4 hr after irradiation in the 300- and the 500-rad groups. The ratio became markedly elevated to 4.2-to-1 in the 300-rad group at 168 hr. This elevation was not seen in the 200-rad group, whose ratio remained depressed throughout the test period. It appears that 200 rads is not the lower limit of radiation detected by serum LDH isoenzyme alterations but that lower levels may be detectable with these methods. (Author)
AD-666 941 HC$3.00 MF$0.65

RELATIONSHIPS BETWEEN CELL POPULATION KINETICS AND RADIATION RESISTANCE IN POCKET MICE (HETEROMYIDAE - PEROGNATHUS).
Northrop Space Labs., Hawthorne, Calif.
J. J. Gambino, and J. W. Towner. 1966, 10p
NASA-CR-69454
Contract NASW-812
Conf- Presented At the 3d Intern. Congr. on Radiation Res., Cortina, Italy, 26 Jun. - 2 Jul. 1966

Descriptors: *Epithelium, *Intestines, *Pocket mice, *Populations, *Radiation tolerance, Cells (biology), Cobalt 60, Degeneration, Radiation injuries, Regeneration (physiology), Thymidine.

For abstract, see STAR 06 09.
N68-18954 HC$3.00 MF$0.65

6S. Stress Physiology

VIGILANCE PERFORMANCE AS A FUNCTION OF TASK AND ENVIRONMENTAL VARIABLES.
George Washington Univ., Alexandria, Va. Human Resources Research Office.
For primary bibliographic entry see Field 5J.
AD-404 212 HC$3.00

EFFECT OF PCO2 ON THE RELATION OF LACTATE AND EXCESS LACTATE TO O2 DEFICIT.
Final rept. Dec 66-Sep 67,
School of Aerospace Medicine Brooks AFB Tex
Stephen M. Cain. Dec 67, 15p Rept no. SAM-TR-67-109

Descriptors: (*Lactates, *Hypoxia), Carbon dioxide, Blood chemistry, Metabolism, Oxygen, Oxygen consumption, Blood analysis.
Identifiers: Hypocapnia, Hypercapnia.

When anesthetized dogs were made hypoxic at constant ventilation, increases in arterial lactate (delta L) compared as well to net O2 deficit (NOD) as did excess lactate (XL). It was asked whether this would hold true if PCO2 was varied during hypoxia. Twelve dogs were made hypoxic for 30 minutes while eucapnic (PCO2 = 40 torr) and again while hypercapnic (PCO2 = 77 torr), with appropriate control and recovery periods. Another group of 12 dogs were treated similarly except one hypoxic period was hypocapnic (PCO2 = 18 torr) and the other eucapnic. NOD was estimated from the total decrease in VO2 during hypoxia by assuming that baseline VO2 would have been unchanged if PO2 was not limited, and by estimating the change in O2 stores during hypoxia. Net O2 repayment (NOR) was estimated similarly. In a graph of delta L against NOD, three different lines were obtained according to the PCO2 level. The same was true for XL against NOD. In 36 or 48 comparisons, NOR was less than NOD. Of the 12 comparisons in which NOR was larger, 7 were hypocapnic, 4 were eucapnic, and only 1 was hypercapnic. In addition to direct effects of altered intracellular pH on lactate metabolism, PCO2 may also alter baseline energy demand during hypoxia by its effect on calorigenesis of liberated catecholamines. (Author)
AD-666 647 HC$3.00 MF$0.65

INVESTIGATION OF THE PRIMATE VESTIBULAR SYSTEM FUNCTION THROUGH ANALY-

SIS OF THE VESTIBULO-OCULAR REFLEX RESPONSE TO VARIOUS INPUT STIMULI.
Master's thesis,
Air Force Inst of Tech Wright-Patterson AFB Ohio School of Engineering
Marvin H. Chasen, and James W. Guthrie. Dec 67, 116p Rept no. GE/EE/67S-7

Descriptors: (*Vestibular apparatus, Primates), Semicircular canals, Reflexes, Eye, Rotation, Acceleration, Responses, Experimental data, Probability, Nystagmus, Proprioception, Mathematical models, Correlation techniques, Space medicine, Theses.
Identifiers: Counterrolling (Eye).

An indirect measurement of dynamic responses of the primate vestibular system was obtained through the measurement of eyeball counterroll from six Rhesus monkeys. A control system was developed to provide three types of input stimuli. These stimuli consisted of constant speed rotations, pendular oscillations, and Gaussian random noise. The experimental data was analyzed by use of correlation functions, power spectral density functions, and probability densities. Results show that angular acceleration and the acceleration resulting from centripetal force affect the counterroll response. Gaussian noise position inputs failed to produce counterroll distributions that are Gaussian. Suppression of response to random inputs was observed, inflicating that suppression does not necessarily result from anticipation of the input. (Author)
AD-666 663 HC$3.00 MF$0.65

EFFECTS OF SLEEP DEPRIVATION ON THE VESTIBULO-OCULAR REFLEX.
Progress rept.,
Army Medical Research Lab Fort Knox Ky
James W. Wolfe, and James H. Brown. 13 Feb 68, 11p Rept no. USAMRL-766
Descriptors: (*Vestibular apparatus, *Fatigue (Physiology)), Sleep, Rotation, Acceleration, Nystagmus, Reflexes, Responses, Stress (Physiology).
Identifiers: *Sleep deprivation, *Rapid-eye movement sleep.

Sixteen young adult men were deprived of sleep for a period of 24 hours in an attempt to assess possible interactions between sleep mechanisms and the vestibular system. Ss were given a pre- and post-test consisting of trials at angular accelerations of 8 degrees/sec sq and 24 degrees/sec sq. Following sleep deprivation, Ss showed a significant increase in fast-phase frequency at 24 degrees/sec sq, and a nonsignificant increment at 8 degrees/sec sq. Slow-phase output reflected a significant decrement at 8 degrees/sec sq, but no significant decrement at 24 degrees/sec sq. Subjective latency estimates of stimulus onset showed no significant changes for either 8 degrees or 24 degrees/sec sq. Discussion centers around possible physiological mechanisms related to sleep and vestibular responses. (Author)
AD-666 750 HC$3.00 MF$0.65

THYROID STATUS OF DOGS CONTINUOUSLY EXPOSED TO ONE-HALF ATMOSPHERE.
Rept. for Jun 64-Jul 66,
School of Aerospace Medicine Brooks AFB Tex
David H. Wood. Nov 67, 21p Rept no. SAM-TR-67-106

Descriptors: (*Thyroid gland, Stress (Physiology)), Pressure breathing, High altitude, Iodine, Corticosteroid agents, Secretion, Blood analysis, Radioactive isotopes, Tracer studies, Space medicine.
Identifiers: Triiodothyronine.

Six male beagle dogs were maintained on ambient air at one-half atmosphere for 33 days and were monitored for protein-bound iodine (PBI), thyroid I 131 avidity, plasma triiodothyronine uptake, and plasma 17-hydroxycorticosteroids. Data were compared with those from littermate controls held at ground level. Increased I 131 uptake and reduced triiodothyronine uptake were observed in the altitude-exposed dogs, while no change in the peripheral blood hydrocortisone level was seen. No difference in the gross, microscopic, or ultrastructural anatomy of the thyroid glands of groups was noted. (Author)
AD-666 906 HC$3.00 MF$0.65

PHYSIOLOGIC AND BIOCHEMICAL OBSERVATIONS ON THE RHESUS MACACA MULATTA EXPOSED TO OXYGEN-RICH ATMOSPHERES.
School of Aerospace Medicine Brooks AFB Tex
For primary bibliographic entry see Field 6T.
AD-666 923 HC$3.00 MF$0.65

VISUAL HORIZONTAL PERCEPTION IN RELATION TO OTOLITH FUNCTION,
Naval Aerospace Medical Inst Pensacola Fla
Earl F. Miller, II, Alfred R. Fregly, and Ashton Graybiel. 23 Dec 66, 16p Rept no. NAMI-989 NASA Order-R-93

Descriptors: (*Space perception, *Vestibular apparatus), Deafness, Visual perception, Rotation, Vision, Nystagmus, Space medicine.
Identifiers: Counterrolling (Eye).

To determine the influence of the otolith organs on visually perceived direction of space the constant and variable errors of normal persons and deaf persons with bilateral labyrinthine defects during nineteen positions of body tilt within plus or minus 90 degrees of gravitational vertical were compared. The general perceptual pattern was similar for the two groups, although that of the labyrinthine-defective group was found to be more variable, and greater E- and A-effects were manifested during several of the tilt positions. A significantly larger E-effect was observed in those subjects (L-Ds) with little or no ocular counterroll. (Author)
AD-666 965 HC$3.00 MF$0.65

STUDY OF AN ANIMAL RESEARCH FACILITY (USING S-4B) FOR A MANNED ORBITAL BIOTECHNOLOGY LABORATORY FINAL REPORT.
Douglas Aircraft Co., Inc., Huntington Beach, Calif. Missile and Space Systems Div.
For primary bibliographic entry see Field 22B.
For abstract, see STAR 06 09.
N68-18706 HC$3.00 MF$0.65

OXYGEN CONSUMPTION AND RESPIRATORY FUNCTIONS AT HIGH ALTITUDES.
Sauerstoffaufnahme Und Respiratorische Funktionen in Erossen Hoehen
National Aeronautics and Space Administration, Washington, D. C.
E. H. Christensen. Dec 67, 15p NASA-TT-F-11284
Tran- Transl. Into English From Skand. Arch. Fuer Physiol. (Berlin), V. 76, 1937 P 88-100

Descriptors: *High altitude breathing, *Human body, *Oxygen metabolism, *Tolerances (physiology), Activity (biology), Aerospace medicine, Biological effects, Human reactions, Oxygen consumption, Rest.

For abstract, see STAR 06 09.
N68-18927 HC$3.00 MF$0.65

BIOPHYSICAL EVALUATION OF THE HUMAN VESTIBULAR SYSTEM SEMIANNUAL STATUS REPORT.
Massachusetts Inst. of Tech., Cambridge. Man-vehicle Control Lab.
J. L. Meiry, and L. R. Young. Jun 67, 22p NASA-CR-93544, MV-67-3
Contract NGR-22-009-156

Descriptors: *Acceleration stresses (physiology), *Human factors laboratories, *Semicircular canals, *Vestibular tests, Acceleration tolerance, High acceleration, Linearity, Rotation.

For abstract, see STAR 06 09.
N68-18951 HC$3.00 MF$0.65

NOISE - EFFECTS ON MAN AND MATERIALS. A SELECTED BIBLIOGRAPHY.
National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
For primary bibliographic entry see Field 20A.
For abstract, see STAR 06 09.
N68-18952 HC$3.00 MF$0.65

THE PROBLEMS OF MAN'S ADAPTATION TO THE LUNAR ENVIRONMENT.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
D. E. Hewes, W. Letko, and A. A. Spady, Jr..
1966, 26p NASA-TM-X-57241
Conf- Presented At the Workshop on Hearing, Bioacoustics, and Biomech., Moffett Field, Calif., 25-27 Jan. 1966 Spon- Sponsored By Nas-nrc

Descriptors: *Astronaut locomotion, *Lunar environment, *Sensorimotor performance, *Space orientation, Human performance, Otolith organs, Proprioceptors, Vertical perception, Visual stimuli.

For abstract, see STAR 06 09.
N68-19011 HC$3.00 MF$0.65

STUDIES OF CIRCADIAN CYCLES IN HUMAN SUBJECTS DURING PROLONGED ISOLATION IN A CONSTANT ENVIRONMENT USING EIGHT-CHANNEL TELEMETRY SYSTEMS.
Naval Submarine Medical Center, Groton, Conn. Physiological Sciences Div.
For primary bibliographic entry see Field 6P.
For abstract, see STAR 06 09.
N68-19137 HC$3.00 MF$0.65

VISUAL HORIZONTAL PERCEPTION IN RELATION TO OTOLITH FUNCTION.
Naval School of Aviation Medicine, Pensacola, Fla.
E. A. Fregly, A. Graybiel, and E. F. Miller. Dec 66, 14p NASA-CR-93657, NAMI-989
NASA ORDER R-93

Descriptors: *Otolith organs, *Space perception, *Vestibular tests, Acceleration tolerance, Human factors laboratories, Human performance, Vision, Visual fields, Visual tasks.

For abstract, see STAR 06 09.
N68-19295 HC$3.00 MF$0.65

6T. Toxicology

DISTRIBUTION AND EXCRETION OF 14C-MONOMETHYLHYDRAZINE.
Final rept. Sep 65-Sep 66,
Aerospace Medical Research Labs Wright-Patterson AFB Ohio
Mildred K. Pinkerton, Edgar A. Hagan, and Kenneth C. Back. Nov 67, 24p Rept no. AMRL-TR-67-175
Presented at Society of Toxicology Annual Meeting (6th), Atlanta, Ga., 25 Mar 67.

Descriptors: (*Methyl hydrazines, Toxicity), Dosage, Excretion, Distribution, Tissues (Biology), Kidneys, Blood analysis, Urine, Pathology, Tracer studies.

A total of 20 mice, 20 rats, 17 dogs, and 16 monkeys received intraperitoneal injections of 14C-monomethylhydrazine (MMH) at doses of 22 mg/kg

(mice), 15 mg/kg (rats), and 10 mg/kg (monkeys and dogs). At 2, 4, 8, and 24 hours after exposure, representative samples of approximately 20 tissues from each animal were processed for 14C assay using liquid scintillation counting techniques. Both blood and urine samples were simultaneously analyzed by a chemical colorimetric method for unchanged MMH, and the results were correlated with total 14C content. Results of the 14C assays indicated that the mouse, rat, and monkey excreted twice as much as the dog in the first 2 hours, and that all 4 species excreted 25-40% of the total dose by 24 hours after injection. Approximately 50% of the total 14C excretion, at all experimental times, was apparently unchanged MMH as implied by the colorimetric results. Tissue distribution of 14C showed the highest concentrations in liver, kidney, bladder, pancreas, and blood serum. Both clinically and pathologically, the dog was apparently much more susceptible than the other species tested to the toxic effects of MMH and to severe kidney damage. (Author)
AD-666 662 HC$3.00 MF$0.65

INHIBITION OF D-ASPARTATE UPTAKE IN RAT CEREBRAL CORTEX SLICES BY HYDRAZINES.
Rept. for Apr 64-Jul 67,
School of Aerospace Medicine Brooks AFB Tex
Miguel A. Medina. Dec 67, 12p Rept no. SAM-TR-67-115

Descriptors: (*Hydrazine, Toxicity), Methyl hydrazines, Amino acids, Cerebral cortex, Convulsive disorders, Dimethyl hydrazine (1-1), Inhibition, Dosage, Nerve cells, Transport properties.
Identifiers: Aspartates.

The uptake of D-aspartate by rat cerebral cortex slices was found to consist of two processes: an energy-requiring system, and possibly nonspecific binding. The accumulation of D-aspartate was inhibited by .0002 M concentrations of hydrazine, monomethylhydrazine (MMH), and 1,1-dimethylhydrazine (UDMH), but not by 1,2-dimethylhydrazine (SDMH). At a higher concentration (.005), hydrazine inhibited uptake by 50%, while UDMH produced a 25% inhibition. Uptake of D-aspartate in cerebral cortex slices from rats given 1.6 mmoles/kg. UDMH (LD50) and sacrificed before any convulsions was no different from control values. The accumulation of D-aspartate in cerebral cortex slices from rats given the same dose of UDMH but allowed to convulse was greater than that of the controls. The lack of inhibition of uptake in cerebral cortex slices from UDMH-injected animals militates against the suggestion hat UDMH might produce convulsions by interfering with active transport across neuronal membranes. (Author)
AD-666 905 HC$3.00 MF$0.65

PHYSIOLOGIC AND BIOCHEMICAL OBSERVATIONS ON THE RHESUS MACACA MULATTA EXPOSED TO OXYGEN-RICH ATMOSPHERES.
Rept. for 17 May 64-24 Mar 65,
School of Aerospace Medicine Brooks AFB Tex
Frode Ulvedal, and H. E. Brown. 28 Jun 67, 27p Rept no. SAM-TR-67-86

Descriptors: (*Oxygen, Toxicity), Hematology, Enzymes, Body weight, Body temperature, Blood chemistry, Space medicine.

Adolescent male rhesus monkeys (Macaca mulatta), weighing 2.9 to 3.4 kg., were exposed to 100% oxygen atmospheres at 258 and 380 mm. Hg pressures for 30 and 22 days, respectively, and the results obtained were compared to the observations made in a ground-level control study using the same chamber system. Physiologic, hematologic, enzymatic, biochemical, and anatomic measurements were obtained throughout the experiments. Several changes and trends were common to all three experiments; however, some were observed only for the oxygen-exposed animals and were dependent on the concentration of oxygen in the atmosphere. (Author)
AD-666 923 HC$3.00 MF$0.65

7. CHEMISTRY

7A. Chemical Engineering

ANALYSIS OF SOME RANDOM BLENDING PROCESSES.
Interim rept.,
City Coll New York Dept of Chemical Engineering
F. J. Krambeck, Reuel Shinnar, and Stanley Katz. 18 Mar 68, 9p
AFOSR-68-0639
Grant AF-AFOSR-921-65
Prepared for presentation at the Canadian Chemical Engineering Conference (16th) Windsor, Ont., 16-19 Oct 66.
Availability: Published in Canadian Journal of Chemical Engineering, v45 p203-9 Aug 67.

Descriptors: (*Turbulence, Statistical analysis), Processing, Statistical distributions, Specifications, Analysis of variance, Probability, Industrial equipment.
Identifiers: *Blending processes, Chemical processing, Reactors (Chemical).

A common problem in the design of mixing and blending equipment is the estimation of the size of the equipment needed to achieve a certain specification. If the statistical properties of the non-uniformities in the production lots to be blended are known one can calculate by known methods the reduction in the variance of the product properties. Specifications however are normally given not in terms of a variance but in terms of limits. These can be estimated from the variance by assuming a Gaussian distribution. In this paper a method is discussed which allows one to calculate these limits directly for some blending problems in which the source of the nonuniformity is due to the production of an off-grade lot. This not only allows more accurate design procedures, but also gives some insights as to the magnitude of the error made by assuming a Gaussian distribution. (Author)
AD-667 120 Not available from CFSTI.

RESIDENCE TIME DISTRIBUTIONS IN SYSTEMS WITH INTERNAL REFLUX.
Revised ed.,
City Coll New York
Reuel Shinnar, and Pinhas Naor. 1 Feb 67, 16p
AFOSR-68-0634
Grant AF-AFOSR-921-65
Revision of report dated 8 Oct 66. Prepared in cooperation with North Carolina Univ., Chapel Hill.
Availability: Published in Chemical Engineering Science, v22 p1369-81 1967.

Descriptors: (*Mass transfer, Statistical analysis), Processing, Turbulence, Diffusion, Statistical distributions, Integral transforms, Industrial equipment, Tanks (Containers), Mathematical models, Tracer studies.
Identifiers: Chemical processing, Reactors (Chemical).

A general method for calculating residence time distributions for systems with internal reflux is described. The method allows the derivation of the Laplace transform of any system composed of mixed vessels with both forward and backward flow between them. In particular, the properties of a linear cascade of mixed vessels with forward and backward flow between the vessels is discussed. Applications to modelling of chemical flow reactors and turbulent diffusion are discussed. (Author)
AD-667 121 Not available from CFSTI.

STUDY OF TURBULENCE CLOSE TO A SOLID WALL.
Illinois Univ Urbana Dept of Chemistry and Chemical Engineering
For primary bibliographic entry see Field 20D.
AD-667 124 Not available from CFSTI.

7B. Inorganic Chemistry

A FLUORINE-19 NMR STUDY OF SOME DIADDUCTS OF TITANIUM TETRAFLUORIDE.
Technical rept. Jun 64-Jan 67,
Air Force Materials Lab Wright-Patterson AFB Ohio
Daniel S. Dyer. Dec 67, 96p Rept no. AFML-TR-67-204

Descriptors: (*Complex compounds, Titanates), (*Titanium compounds, Nuclear magnetic resonance), Fluorides, Stereochemistry, Chemical bonds, Exchange reactions, Molecular energy levels, Chemical equilibrium.
Identifiers: *Fluorotitanates, Titanium tetrafluoride.

Several series of the diadducts of titanium tetrafluoride were studied with high-resolution fluorine-19 nuclear magnetic resonance (nmr) spectroscopy. These series consisted of fluorotitantate complexes of formula TiF4.2 (donor) and TiF5. (donor) (-1), where donor represents an organic molecule (Lewis base) which coordinates through oxygen. The TiF4.2 (donor) adducts included both TiF4.2D (D = donor) complexes, in which the donors are identical, and TiF4.D,D' complexes, in which D and D' represent different Lewis bases. Fluorine-19 chemical shifts and spin-spin coupling constants were determined for most of these fluorotitanate complexes. The temperature dependence of the TiF4.2D spectra was also studied. (Author)
AD-666 658 HC$3.00 MF$0.65

LENINGRAD UNIVERSITY. HERALD, VOL. 19, NO. 22, PHYSICS AND CHEMISTRY SERIES, NoO. 4, 1964.
Foreign Technology Div Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 20H.
AD-666 727 HC$3.00 MF$0.65

FINITE EXPANSION OF A HOLE IN A RIGID-WORKHARDENING DISK OF INITIALLY NON-UNIFORM THICKNESS.
Technical rept.,
California Univ San Diego La Jolla Dept of the Aerospace and Mechanical Engineering Sciences
S. Nemat-Nasser. Mar 68, 23p Rept no. TR-17
Contract N00014-67-A-0109-0003
See also TR-16, AD-666 831.

Descriptors: (*Metals, Deformation), (*Disks, Strain hardening), Strain (Mechanics), Plasticity, Mathematical analysis, Perturbation theory, Interactions, Equations, Equilibrium, Modulus of elasticity, Incompressible flow.
Identifiers: Holes (Cavities), *Finite expansion.

A complete analytical solution is developed for the problem of finite expansion of a circular hole of zero (pin-hole) or finite initial radius, using Tresca's yield condition and the associated flow rule together with an isotropic strain-hardening law. Results of previous investigations are obtained as special cases of the present more general, closed-form solution. (Author)
AD-666 831 HC$3.00 MF$0.65

PHOSPHORUS-31 NUCLEAR MAGNETIC RESONANCE STUDY OF TERTIARY PHOSPHINE DERIVATIVES OF GROUP VI METAL CARBONYLS. II. 'MIXED' LIGAND COMPLEXES,
Maryland Univ College Park Dept of Chemistry
Samuel O. Grim, David A. Wheatland, and Patrick R. McAllister. Mar 68, 5p

AFOSR-68-0506
Grant AF-AFOSR-782-67
See also AD-662 439.
Availability: Published in Inorganic Chemistry, v7 n1 p161-3 Jan 1968.

Descriptors: (*Phosphines, Nuclear magnetic resonance), (*Complex compounds, Phosphines), (*Metal carbonyls, Phosphines), Organic phosphorus compounds, Stereochemistry, Molybdenum compounds, Chromium compounds, Tungsten compounds, Molecular isomerism.

The preparation, infrared spectra in the carbonyl stretching region, and phophorus-31 nmr spectra of nine 'mixed' phophorus ligand derivatives of the group VI metal carbonyls are reported. In the two compounds which have phosphorus atoms in cis positions, the phosphorus-phosphorus spin-spin coupling constant is considerably smaller than for those corresponding situations with trans phosphorus atoms. (Author)
AD-666 846 Not available from CFSTI.

FAR-INFRARED INTENSITY STUDIES OF IODINE COMPLEXES,
Iowa Univ Iowa City Dept of Chemistry
J. Yarwood, and Willis B. Person. 31 Jan 68, 10p
AROD-1733:30
Grant DA-ARO (D)-31-124-G387
Prepared in cooperation with Florida Univ., Gainesville. Dept. of Chemistry.
Availability: Published in Journal of the American Chemical Society, v90 n3 p594-600 Jan 31 1968.

Descriptors: (*Iodine compounds, Complex compounds), (*Complex compounds, *Infrared spectroscopy), Pyridines, Benzenes, Organic sulfur compounds, O-heterocyclic compounds, Amines, Acetonitriles.
Identifiers: Charge transfer complexes.

Measurements were made of the frequencies and intensities of the 'I-I stretching' vibrations for 12 complexes with pyridine, 3-picoline, 2,6-lutidine, benzene, p-dioxane, and diethyl sulfide, and more qualitative measurements on the 12 complexes with acetonitrile and diethylamine. The measurements were made using polyethylene cells, with a far-infrared spectrometer. For the first three complexes, comparison can be made to the results obtained by Lake and Thompson, using an interferometer. The agreement is good enough to verify the general reliability of these techniques. The results are interpreted in terms of the theory given by Friedrich and Person. For the amine.I2 complexes, the results are quite reasonable. The results for dioxane.I2 and for diethyl sulfide.I2 appear to be anomalous. (Author)
AD-666 868 Not available from CFSTI.

NEWS OF INSTITUTIONS OF HIGHER LEARNING. NONFERROUS METALLURGY, NO. 4, 1964.
Foreign Technology Div Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 11F.
AD-666 896 HC$3.00 MF$0.65

DIRECT SPECTROPHOTOMETRIC ANALYSIS OF AMMONIA IN NATURAL WATERS BY THE PHENOL-HYPOCHLORITE REACTION.
Research and development rept.,
Naval Ship Research and Development Center Annapolis Md Annapolis Div
Robert T. Emmet. Mar 68, 19p
NSRDC-2570

Descriptors: (*Sea water, *Ammonia), Water, Chemical indicators, Spectroscopy, Phenols, Hypochlorites, Microanalysis, Salinity.

The phenol-hypochlorite reaction has been adapted to detect microgram quantities of ammonia natural waters. The procedure does not require that the sample be heated, be alkaline, or that the ammonia be extracted. This method estimates ammonia in waters of varying salinity to a precision of 20% at 0.3 microgram atom NH3/l. The lower limit of detection is 0.2 microgram atom NH3/l, and the analysis is suitable for use at sea. (Author)
AD-666 959 HC$3.00 MF$0.65

THE REACTIONS OF 1-ISOPROPENYLCARBORANE WITH DINITROGEN TETROXIDE, TETRAFLUOROHYDRAZINE, AND BROMINE,
Rohm and Haas Co Huntsville Ala Redstone Research Labs
W. E. Hill. 28 Sep 67, 4p
Contracts DA-01-021-AMC-11536 (Z), DAAH01-67-C-0655
Availability: Published in Inorganic Chemistry, v7 n2 p222-4 1968.

Descriptors: (*Organoboranes, Chemical reactions), Oxidizers, Nitrogen oxides, Hydrazine derivatives, Fluorine compounds, Bromine, Addition reactions, Organic nitrogen compounds, Ethers, Fluoroamines, Nitriles, Bromine compounds, Synthesis (Chemistry), Propenes, Propanes.
Identifiers: *Carboranes, Carboranyl propanes, Isopropenyl carboranes, Tetrafluorohydrazine.

The preparation of several new compounds by reaction of 1-isopropenylcarborane with N2O4, N2F4, and Br2 is reported. Derivatives of some of these compounds have been made. The susceptibility of the alkenyl group to radical attack is discussed as well as its inert nature with respect to ionic additions. Some physical properties of the new compounds are reported. (Author)
AD-666 988 Not available from CFSTI.

ELECTRONIC STRUCTURE AND STABILITY OF THE INORGANIC FULMINATES,
Cambridge Univ (England) Cavendish Lab
Z. Iqbal, and A. D. Yoffe. 1967, 15p
AFOSR-68-0613
Grant AF-EOAR-03-67
Availability: Published in Proc. Roy. Soc., v302 p35-49 1967.

Descriptors: (*Fulminates, Chemical bonds), (*Explosive materials, Stability), Sodium compounds, Potassium compounds, Thallium compounds, Silver compounds, Mercury compounds, Absorption spectrum, Refractive index, X-ray diffraction analysis, Infrared spectroscopy, Crystal structure, Great Britain.
Identifiers: Mercury fulminate, Potassium fulminate, Silver fulminate, Sodium fulminate, Thallous fulminate.

The fulminates form a class of compounds isoelectronic with the azides and cyanamides. They are, however, extremely sensitive materials and even the ionic salts explode. A study has been made of some of the optical properties of small crystals and thin deposited films, and of the solid state infrared spectra, in order to determine the nature of the bonds in the sodium, potassium, thallous, silver and mercury salts. Structural data is also available and it is concluded that while sodium, potassium and thallous fulminates are ionic solids, the mercury salt is covalent. It is likely that in the silver salt there is also a high degree of directed bonding in the solid state. The nature of the bond between the metal and the carbon atom of the fulminate group can, however, be different in the silver and mercury salts and this will be reflected in the order of the stability of the salts. (Author)
AD-667 129 Not available from CFSTI.

THE ACID-CATALYZED AQUATION OF THE ALPHA-OXALATO TRIETHYLENETETRAMINE CHROMIUM (III) ION.
Final rept.,
Frank J Seiler Research Lab United States Air Force Academy Colo
Jon M. Veigel. Mar 68, 8p Rept no. SRL-68-0007
Availability: Published in Inorganic Chemistry, v7 p69-73 1968.

Descriptors: (*Chromium compounds, Complex compounds), (*Complex compounds, Reaction kinetics), Ions, Catalysis, Stereochemistry, Spectra (Visible + ultraviolet), Amines, Oxalates, Chemical reactions.
Identifiers: Oxalato triethylenetetramine chromium compounds, Aquation, Aquo compounds.

The primary step in the aquation of alpha-Cr (trien) (C2O4) (+) was found to be the formation of the previously unreported Cr (trienH) (OH2) (C2O4) (2+), probably of the alpha configuration. The acid dependence of the observed pseudo-first-order rate constant can be empirically described by kobsd = (k1K (H (+))/ (I+K (H (+)). (Author)
AD-667 177 Not available from CFSTI.

EXPLORATORY STUDY OF HYPERGOLIC IGNITION SPIKE PHENOMENA, PHASE 2, PART 2, JULY 1 TO SEPTEMBER 30, 1966.
Bureau of Mines, Pittsburgh, Pa. Explosives Research Center.
For primary bibliographic entry see Field 21I.
For abstract, see STAR 06 09.
N68-19268 HC$3.00 MF$0.65

ANHYDROUS CALCIUM DIOXIDE AND THE CONSTITUTION OF ITS HYDRATES.
Sur le Bioxyde de Calcium Anhydre Et La Constitution de Ses Hydrates
National Aeronautics and Space Administration, Washington, D. C.
De Forcrand . Mar 68, 5p NASA-TT-F-11619
Tran- Transl. Into English From Compt. Rend., V. 130, 1900 P 1388-1391

Descriptors: *Calcium compounds, *Calcium oxides, *Heat of formation, *Hydration, *Thermal stability, Kinetic energy, Thermochemical properties.

For abstract, see STAR 06 09.
N68-19483 HC$3.00 MF$0.65

PROCESSES FOR RECOVERING SULFUR FROM SECONDARY SOURCE MATERIALS,
Information circular,
Bureau of Mines, Washington, D. C.
Bertram K. Shibler, and M. W. Hovey. 1962, 67p
IC-8076

Descriptors: (*Sulfur, Production), (*Manufacturing methods, State-of-the-art reviews), Sources, Sulfur compounds, Coal, Pyrites, Gypsum, Wastes (Industrial), Oxidation, Reduction (Chemistry), Waste gases, Flotation (Separation), Distillation, Recovery, Ores (Metal sources), Oxides, Acids, Dioxides, Bibliographies.

During a research program to develop improved methods for recovering elemental sulfur and useful sulfur compounds from secondary source materials, the technical literature was searched for pertinent articles on processing methods. This report summarizes results of the literature survey and describes the more important processes that have been used or suggested for recovering sulfur and sulfur compounds from all non-Frasch sources. The bibliography presented represents a survey of the available English language literature on the subject through 1958, with particular attention focused on the period 1950 through 1958. Engineering Index and Industrial Arts Index were the principal guides used in the survey of this period. Chemical Abstracts were used to a limited extent to identify a few key foreign articles and patents. The Sulfur Symposium published in November 1950 by Industrial and Engineering Chemistry includes a broadly representative selection of the literature up to 1949. Therefore, this reference was used extensively to locate and list pertinent articles on processing methods reported in the period prior to 1950. (Author)
PB-177 760 HC$3.00 MF$0.65

7C. Organic Chemistry

INVESTIGATION OF THE PHOTOPOLYMERIZATION PROCESS.
Final rept. 14 Feb 63-13 Mar 66,
General Aniline and Film Corp., Binghamton, N. Y. Photo and Repro Div.
Edward Cerwonka, and Albert S. Deutsch. Jun 66, 64p
ECOM-00119-F
Contract DA-36-039-AMC-00119 (E)

Descriptors: (*Polymerization, *Photochemistry), (*Photographic images, Photoconductivity), Photographic techniques, Photoelectric materials, Photographic materials, Zinc compounds, Oxides, Cadmium compounds, Sulfides, Selenides, Sulfur compounds, Gels, Coatings, Catalysts, Electrochemistry, Binders, Solubility, Anodes, Cathodes, Polarization, Thickness, Carbonates, Guanidines, Polyvinyl alcohol.
Identifiers: Polyacrylamide, Dry photography.

A new grade of zinc oxide was found to have higher photoconductivity than previous samples. The speed of the photoelectropolymerization process was found to increase by a factor of four when using this sample; it is four times faster than scona reflex paper type C (Silver halide photographic paper). Newly acquired photoconductors have been tested in the sandwich arrangement used in the photoelectrolytic imaging system. One variety of cadmium sulfide (Sylvania PC-103) when exposed in conjuction with a monomer layer on aluminum showed a photographic speed five times faster than that of scona reflex paper type C. A cadmium sulfoselenide photoconductor was characterized by extremely fast photoresponse. Each of these photoconductors differs from zinc oxide in that it transmits photocurrent in either direction through the layer. The concentration range was determined for ferrous ammonium sulfate in the monomer coating of the positive imaging system. The sensitivity of the positive imaging system was found to be 50% less than that of the negative.
AD-484 544 HC$3.00 MF$0.65

NONAROMATIZATION REACTIONS OF BICYCLO (2.2.0)HEXA-2,5-DIENE,
Stanford Univ Calif Dept of Chemistry
E. E. van Tamelen, and D. Carty. 19 Jul 67, 5p
AROD-5227:3
Contract DA-31-124-ARO (D)-285
Availability: Published in Journal of the American Chemical Society, v89 n15 p3922-3 Jul 19 1967.

Descriptors: (*Cycloalkenes, Chemical reactions), (*Polycyclic compounds, Chemical reactions), Cyclohexenes, Dienes, O-heterocyclic compounds, Bromine compounds, Esters, Complex compounds, Synthesis (Chemistry).
Identifiers: Bicyclohexadienes.

A study was made of reactions of the parent 'Dewar benzene', bicyclo (2.2.0)hexa-2,5-diene, with various electrophilic species. It was found that the reactions usually do not involve aromatization, but characteristically provide nonbenzoid transformation products. For example, treatment of 'Dewar benzene' with bromine in alkaline solution yielded a mixture of 2,3-dibromides, with no bromobenzene being detected.
AD-666 634 Not available from CFSTI.

2-AMINO-2-THIAZOLINE. IV. THE RING OPENING OF 2-AMINO-2-THIAZOLINES AND 2-AMINO-2-SELENAZOLINE WITH HYDROGEN SULFIDE TO FORM THIOUREA DERIVATIVES,
Walter Reed Army Inst of Research Washington D C
Daniel L. Klayman, and Peter T. McIntyre. Feb 68, 4p
See also AD-650 378.
Availability: Published in Journal of Organic Chemistry, v33 n2 p884-7 1968.

Descriptors: (*N-heterocyclic compounds, Chemical reactions), (*S-heterocyclic compounds, Chemical reactions), (*Thiourea, Synthesis (Chemistry)), Selenium compounds, Heterocyclic compounds, Hydrogen compounds, Sulfides, Thiols, Imines, Amines, Thiazoles.
Identifiers: *Amino thiazolines, Amino selenazolines, Hydrogen sulfide, Se-heterocyclic compounds.
AD-666 698 Not available from CFSTI.

KINETICS AND MECHANISM OF THE REACTION OF TRIPHENYLPHOSPHINE WITH ALPHA-HALOACETOPHENONES,
Yeshiva Univ New York Belfer Graduate School of Science
Irving J. Borowitz, and Howard Parnes. Feb 68, 7p
AFOSR-68-0495
Grants AF-AFOSR-938-65, AF-AFOSR-1170-66
Availability: Published in Journal of Organic Chemistry, v32 p3560-6 Nov 1967.

Descriptors: (*Phosphines, Chemical reactions), (*Acetophenones, Chemical reactions), Bromine compounds, Chlorine compounds, Displacement reactions, Pyridines, Reaction kinetics.
Identifiers: Triphenyl phosphines, Bromo acetophenones, Chloro acetophenones.

The reaction of triphenylphosphine and alpha-bromoacetophenone is shown to be a second order reaction. The reaction is only weakly accelerated by electron-withdrawing groups on the phenyl ring. Similar results are found for the reaction of pyridine with alpha-bromoacetophenone. The reactions of alpha-chloroacetophenone with triphenylphosphine or pyridine are much slower and also second order over-all. The simplest mechanism for all of these reactions involves an SN2 type of displacement of halide ion by the nucleophile. Attack on bromine of alpha-bromoacetophenone by triphenylphosphine, which gives the debrominated ketone, may occur only in the presence of prototrotic species. (Author)
AD-666 706 Not available from CFSTI.

POLYMER SYNTHESIS: A SURVEY OF GOVERNMENT CONTRACTS SINCE 1960,
Plastics Technical Evaluation Center Dover N J
Arnold E. Molzon. Jan 68, 38p Rept no. PLASTEC Note-19

Descriptors: (*Polymers, Synthesis (Chemistry)), Heat-resistant materials, Plastics, Elastomers, Solid rocket propellant binders, Radiation chemistry, Photochemistry, Compatibility, Lubricants, Thermal insulation, Electric insulation, Reviews, Bibliographies, Contracts.

The report lists contracts sponsored by the Department of Defense and the National Aeronautics and Space Agency in the area of polymer synthesis, from 1960 to the present. Over 160 are identified as to contract number, contractor, and report output. The areas of polymer synthesis covered include: high temperature polymers; polymer resins as binders for propellants and composites; radiation induced polymerization; polymers resistant to radiation, liquid propellants, sterilization; polymers as lubricants, electrical conductors, liquid dielectrics, electrical insulation, and thermal insulation. (Author)
AD-666 758 HC$3.00 MF$0.65

SYNTHESIS OF NEW FLUORINE-CONTAINING NITROSO COMPOUNDS, COPOLYMERS AND TERPOLYMERS.
Final rept. Jul 63-Nov 66,
Peninsular Chemresearch Inc Gainesville Fla
Eugene C. Stump, and Calvin D. Padgett. Nov 67, 122p
USA-NLABS-TR-68-33-CM, C/OM-38
Contract DA-19-129-AMC-152 (N)

Descriptors: (*Halogenated hydrocarbons, Synthesis (Chemistry)), (*Nitroso compounds, Synthesis (Chemistry)), Fluorine compounds, Organic sulfur compounds, Aromatic compounds, Esters, Alkanes, Polymers, Copolymerization, Polyethylene plastics, Ethers, Spectra (Infrared), Nuclear magnetic resonance, Elastomers.
Identifiers: Nitroso rubber.

The report describes work carried out in the area of nitroso polymers. Two general classes were investigated. These were (1) sulfur-containing nitroso polymers and (2) nitroso polymers containing functional groups. Synthesis of a wide variety of fluorine-containing nitroso compounds and olefins is described, as well as the synthesis of various fluorine-containing intermediates. Nitroso copolymers and terpolymers were prepared containing functional groups such as halogen, ester, double bonds, and methoxy. Properties of selected systems are described. A terpolymer which could be cross-linked by peroxide was prepared using methyl 4-nitrosoperfluorobutyrate as the termonomer. Infrared spectra and NMR analysis of the new monomers and polymers are included. (Author)
AD-666 801 HC$3.00 MF$0.65

LADDER POLYPHENOXAZINES,
Iowa Univ Iowa City Dept of Chemistry
J. K. Stille, and M. E. Freeburger. 1968, 12p
AROD-5199:8
Contract DA-31-124-ARO (D)-295
Availability: Published in Journal of Polymer Science, PtA-1, v6 p161-9 1968.

Descriptors: (*N-heterocyclic compounds, *Polymers), (*O-heterocyclic compounds, Polymers), Alcohols, Amines, Polymerization, Quinones, Organic solvents, Thermal stability, Polycyclic compounds.
Identifiers: *Ladder polymers, Polyphenoxazines.

Two ladder polyphenoxazines were prepared by the polymerization of 4,6-diaminoresorcinol dihydrochloride (I) with 2,5-dihydroxy-p-benzoquinone (III), or 2,5-diacetoxy-p-benzoquinone (II) and with 2,5-dihydroxy-3,6-dichloro-p-benzoquinone (IV) in a hexamethylphosphoramide (HMP) solvent. When tetrahydrofuran (THF) was the polymerization solvent, the reaction of I with II or IV produced a linear poly-Shiff's base which could be converted to the ladder polymer by heating in HMP. The thermal stability of the ladder polyphenoxazines was surprisingly poor; a slow decomposition started at ca.275C. under nitrogen. (Author)
AD-666 862 Not available from CFSTI.

LADDER POLYQUINOXALINES FROM AN ALIPHATIC TETRAKETONE,
Iowa Univ Iowa City Dept of Chemistry
J. K. Stille, and M. E. Freeburger. 31 Jul 67, 7p
AROD-5199:9
Contract DA-31-124-ARO (D)-295
Availability: Published in Polymer Letters, v5 p989-2 1967.

Descriptors: (*N-heterocyclic compounds, *Polymers), Cyclohexanones, Polymerization, O-heterocyclic compounds, Polycyclic compounds, Spectra (Visible + ultraviolet).
Identifiers: *Ladder polymers, Polyquinoxalines.

A series of ladder polyquinoxalines has been prepared which employed an aliphatic tetracarbonyl monomer, 3,3,6,6-tetramethylcyclohexan-1,2,4,5-tetraone. (Author)
AD-666 865 Not available from CFSTI.

DIELS-ALDER POLYMERS. III. POLYMERS CONTAINING PHENYLATED PHENYLENE UNITS,
Iowa Univ Iowa City Dept of Chemistry
H. Mukamal, F. W. Harris, and J. K. Stille. 1967, 12p
AROD-5199:7

Contract DA-31-124-ARO (D)-295
Availability: Published in Journal of Polymer Science: Part A-1, v5 p2721-9 1967.

Descriptors: (*Diene synthesis, *Polymers), (*Aromatic compounds, Polymers), Cyclopentenes, Dienes, Ketones, Polymerization, Alkynes, Thermal stability.
Identifiers: *Polyphenylenes.

The Diels-Alder reaction of biscyclopentadieneones with diacetylenes produces colorless, soluble, phenylated polyphenylenes of high molecular weight in nearly quantitative conversions. The polymers are noncrystalline, form clear films, and are stable in air to 550C. Under nitrogen, the polymers lost approximately half the phenyl groups attached to the phenylene main chain to give brown-black insoluble polyphenylenes of very low crystallinity. (Author)
AD-666 867 Not available from CFSTI.

THE REACTION OF 9-NITROANTHRACENE WITH SODIUM CYANIDE IN DIMETHYLFORMAMIDE,
Illinois Univ Urbana Dept of Chemistry and Chemical Engineering
R. G. Landolt, and H. R. Snyder. Jan 68, 8p
AROD-5036:1
Grant DA-ARO (D)-31-124-G857
Availability: Published in The Journal of Organic Chemistry, v33 n1 p403-7 Jan 1968.

Descriptors: (*Anthracenes, Chemical reactions), (*Cyanides, Chemical reactions), (*Nitriles, Synthesis (Chemistry)), Organic nitrogen compounds, Complex compounds, Oxidation-reduction reactions, Amines, Alcohols, Ketones, Substitution reactions, Formamides.
Identifiers: Anthryl nitriles, Nitro anthracenes, Sodium cyanide.

The interaction of 9-nitroanthracene with sodium cyanide in DMF at room temperature gives a solution which exhibits an electron paramagnetic resonance signal and from which a series of products, including 9-cyano-10-nitroanthracene, 9-amino-10-cyanoanthracene, 9,10-dicyanoanthracene, 9-cyano-10-anthranol, and 9-cyano-10-anthrone can be isolated. Product distributions under a variety of reaction conditions have been studied. Product formation is discussed in terms of oxidation-reduction of a Meisenheimer adduct and nucleophilic substitution. (Author)
AD-666 873 Not available from CFSTI.

COLOR REACTIONS OF PYRIDINES WITH PENTACYANOAMMINOFERRATE,
National Research Council of Canada Saskatoon (Saskatchewan) Prairie Regional Lab
T. A. Larue. 1968, 6p
NRC-9821
Availability: Published in Analytica Chimica Acta v40 p437-42 1968.

Descriptors: (*Pyridines, *Chemical indicators), Sodium compounds, Cyanides, Ammonium compounds, Ferrates, Colorimetric analysis, Chromatographic analysis, Spectroscopy, Canada.
Identifiers: Trisodium pentacyano amminoferrate.

Trisodium pentacyanoamminoferrate is proposed as a spot test, chromatographic spray or spectrophotometric reagent for pyridines. A 1:1 colored complex of the reagent and pyridine derivative is formed in aqueous solution. The intensity and stability of the color varies with the pH. (Author)
AD-666 881 Not available from CFSTI.

THE KINETICS OF THE REDUCTION OF t-BUTYL CHLORIDE AND t-BUTYL BROMIDE BY ORGANOTIN HYDRIDES.
National Research Council of Canada Ottawa (Ontario) Div of Applied Chemistry
For primary bibliographic entry see Field 7D.
AD-666 885 Not available from CFSTI.

2-AZOXYBENZOIC ACIDS AS BENZYNE PERCURSORS,
Rohm and Haas Co Huntsville Ala Redstone Research Labs
Travis E. Stevens. 1968, 2p
Contract DA-01-021-AMC-11536 (Z)
Availability: Published in Journal of Organic Chemistry, v33 p855-6 1968.

Descriptors: (*Alkynes, Synthesis (Chemistry)), (*Benzenes, Alkynes), Benzoic acids, Organic nitrogen compounds, Fluorine compounds, Organic sulfur compounds, Naphthalenes, Anthracenes.
Identifiers: Benzyne.

2-Fluoroazoxy- and 2-tolylazoxy-benzoic acids and several of their salts were prepared and then heated in an attempt to generate benzyne. When refluxed with anthracene, used as a benzyne trapping agent, triptycene (9,10-dihydro-9,10-o-benzoanthracene) was obtained in yields of up to 25%; use of the benzyne trapping agent 2,3,4,5-tetraphenyl cyclopentadienone, under similar conditions, resulted in the isolation of 1,2,3,4-tetraphenyl naphthalene in 24% yields.
AD-666 986 Not available from CFSTI.

THE REACTIONS OF 1-ISOPROPENYLCARBORANE WITH DINITROGEN TETROXIDE, TETRAFLUOROHYDRAZINE, AND BROMINE,
Rohm and Haas Co Huntsville Ala Redstone Research Labs
For primary bibliographic entry see Field 7B.
AD-666 988 Not available from CFSTI.

DIALKYLAMINOTELLURIUM (VI) FLUORIDES,
Leicester Univ (England) Dept of Chemistry
G. W. Fraser, R. D. Peacock, and P. M. Watkins. Feb 68, 3p
AFOSR-68-0554
Grant AF-EOAR-96-63
Availability: Published in Chemical Communications, p1248 1967.

Descriptors: (*Tellurium compounds, Synthesis (Chemistry)), Amines, Fluorides, Spectra (Infrared), Nuclear magnetic resonance, Great Britain.
Identifiers: *Organic tellurium compounds, Dimethylamino tellurium pentafluorides, Bis (dimethylamino) tellurium tetrafluorides.

Compounds containing the SF5 group in which the sulphur atom is bonded to C, N, and O, are well known, but the corresponding area of tellurium chemistry has been little explored, and is restricted to oxygen-containing compounds. The first derivatives of tellurium (VI) in which the tellurium atom is bonded to nitrogen is reported. (Author)
AD-666 995 Not available from CFSTI.

THE SELF-REACTION OF sec-BUTYLPEROXY RADICALS. CONFIRMATION OF THE RUSSELL MECHANISM,
National Research Council of Canada Ottawa (Ontario) Div of Applied Chemistry
J. A. Howard, and K. U. Ingold. 1968, 4p
NRC-9992
Availability: Published in Journal of the American Chemical Society, v90 n4 p1056-8 Feb 14 1968.

Descriptors: (*Peroxides, Chemical reactions), Hydrocarbons, Oxidation, Atomic energy levels, Stereochemistry, Canada.

The identification of singlet oxygen in the self-reaction of sec-butylperoxy radicals is offered as experimental support for the Russel (JACS v79 p3871 1957) mechanism of chain termination in the oxidation of hydrocarbons.
AD-667 067 Not available from CFSTI.

NEIGHBORING GROUP EFFECTS IN PHOSPHONATE ESTER HYDROLYSIS. I. NEIGHBORING CARBONYL GROUP IN PARANITROPHENYL PHENACYL METHYLPHOSPHONATE.
Technical rept.,
Edgewood Arsenal, Md.
Claire N. Lieske, Edward G. Miller, Jr., Gerald J. Zeger, and George M. Steinberg. Mar 67, 39p
EA-TR-4061

Descriptors: (*Esters, *Phosphonic acids), (*Hydrolysis, Esters), (*Acetylcholinesterase, *Organic phosphorus compounds), Reaction kinetics, Benzenes, Nitrates, Nitrophenols, Enzymes, Cholinesterase inhibitors.
Identifiers: Phosphonates, Phenyl radicals, Methyl radicals, Methyl phosphonates, Methyl phosphonate/p-Nitrophenyl phenacyl.

Kinetic studies on the alkaline hydrolysis of p-nitrophenyl phenacyl methylphosphonate, 1-anthraquinonyl p-nitrophenyl methylphosphonate, and ethyl p-nitrophenyl methylphosphonate were carried out. The results clearly demonstrate the participation of the neighboring carbonyl group in markedly accelerating the alkaline hydrolysis of selected methylphosphonates. Mechanisms are offered as possible explanations of the rate of enhancement. (Author)
AD-812 673 HC$3.00 MF$0.65

7D. Physical Chemistry

SYNTHESIS OF DIATOMIC RADICALS.
Technical rept.,
National Bureau of Standards, Washington, D. C.
H. E. Radford. 1 Feb 64, 14p NBS-8180
Contract NAonr-16-64

Descriptors: (*Free radicals, Diatomic molecules), Microwave spectroscopy, Paramagnetic resonance, Molecular structure, Line spectrum, Synthesis, Absorption spectrum.
Identifiers: Diatomic radicals synthesis.

Free diatomic radicals, studied for many years by the methods of optical spectroscopy, have mostly resisted similar attempts to observe their microwave spectra. Lacking has been a systematic method of producing and maintaining cool, reasonably dense, gases of these simple but extremely reactive molecules. In this note a discovery is reported of such a method, along with some preliminary results obtained with it. Among these results are microwave spectra recorded for the molecules SeH and TeH.
AD-430 393 HC$3.00

CHEMILUMINESCENT MATERIALS.
Technical rept. no. 7, 1 Dec 64-28 Feb 65.
American Cyanamid Co., Stamford, Conn. Central Research Div.
28 Feb 65, 72p
Contract Nonr-4200 (00), ARPA Order-299-3

Descriptors: (*Fluorescence, Polycyclic compounds), (*Polycyclic compounds, Fluorescence), N-Heterocyclic compounds, Aromatic compounds, Hydrogen peroxide, Oxalates, Peroxides, Chemical reactions, Decomposition, Excitation, Electron transitions, Chlorine compounds, Ethers, Alcohols, Free radicals, Chlorides, Tables, Spectra (Infrared), Absorption spectrum, Anhydrides, Esters, Amides.
Identifiers: Chemiluminescence, Oxalyl peroxide, Anthracene/9-10-Diphenyl, Perylene, Oxalyl Chloride, Acridines.

Progress in determining mechanisms of processes fundamental to chemiluminescence is reported with particular reference to (1) studies of oxalyl peroxide chemiluminescence (2) studies of new, potentially useful, chemiluminescent reactions related to oxalyl peroxide decompositions, and (3) synthesis and exploratory studies of new potentially chemiluminescent systems. (Author)
AD-460 413 HC$3.00

Group 7D—Physical chemistry

TIME-DEPENDENCE OF CRYSTAL ORIENTATION IN CRYSTALLINE POLYMERS.
Technical rept.,
Massachusetts Univ Amherst Polymer Research Inst
R. S. Stein. Nov 67, 31p
ONR-TR-96
Contract Nonr-3357 (01)

Descriptors: (*Polymers, Crystals), (*Polyethylene plastics, Deformation), Optical analysis, Birefringence, Stresses, Strain (Mechanics), Crystal structure, Relaxation time, X-ray diffraction analysis, Dislocations, Viscoelasticity.

The results of two methods for studying molecular processes accompanying the deformation of polyethylene are described. The examination of spherulite deformation by observing light scattering patterns along with measurement of the birefringence, stress and strain during the rapid extension of polyethylene shows that this initial structural deformation is essentially instantaneous. Dynamic x-ray diffraction shows that this is followed by a slower relaxation involving change in the orientation of the crystals by two processes, the lower temperature one involving slipping of lamellae past each other and the higher temperature one involving viscoelastic flow of the crystals. (Author)
AD-666 622 HC$3.00 MF$0.65

THE POLARIZATION OF FLUORESCENT LIGHT FROM A UNIAXIALLY ORIENTED RUBBER.
Technical rept.,
Massachusetts Univ Amherst Polymer Research Inst
R. S. Stein. Feb 68, 25p
ONR-TR-102
Contract Nonr-3357 (01)

Descriptors: (*Rubber, *Fluorescence), Emissivity, Polarization, Molecular structure, Elasticity, Kinetic theory, Excitation, Elongation.

The polarization of fluorescence from a polymer characterizes two segment orientation functions, fs (2) and fs (4). These may be calculated as a function of elongation using the kinetic theory of rubber elasticity. Three cases are considered: (a) the transition moment direction lies parallel to the segment axis and does not change its orientation during the lifetime of the excited state, (b) the transition moment direction lies at an angle to the segment axis, and (c) the transition moment changes its orientation during the lifetime of the excited state. (Author)
AD-666 623 HC$3.00 MF$0.65

THE EFFECT OF BIREFRINGENCE ON LOW ANGLE LIGHT SCATTERING PATTERNS FROM ORIENTED POLYMER FILMS.
Technical rept.,
Massachusetts Univ Amherst Polymer Research Inst
R. S. Stein, P. F. Erhardt, and W. Chu. Dec 67, 16p
ONR-TR-101
Contract Nonr-3357 (01)

Descriptors: (*Polymers, Birefringence), (*Polyethylene plastics, Optical properties), Films, Anisotropy, Light, Scattering, Polarization.

The effect of birefringence of a polymer film upon its photographic light scattering pattern is considered for the case of a single anisotropic two-dimensional spherulite imbedded in a birefringent matrix. It is shown that for the case of a polarizer and analyzer crossed at +45 deg. and -45 deg. to the analyzer the scattering pattern is modified in a manner agreeing with experimental observation. (Author)
AD-666 624 HC$3.00 MF$0.65

THE DICHROISM AND BIREFRINGENCE OF POLYMERS CONTAINING POLYENE SEGMENTS, PART II.
Technical rept.,
Massachusetts Univ Amherst Polymer Research Inst
Y. Shindo, and R. S. Stein. Jan 68, 26p
ONR-TR-92
Contract Nonr-3357 (01)

Descriptors: (*Polymers, Optical properties), (*Polyvinyl chloride, Optical properties), Molecular structure, Statistical distributions, Birefringence, Statistical mechanics, Polarization.
Identifiers: Dichroism, Polyenes.

The theory of birefringence and dichroism of oriented polyene containing polyvinyl chloride is extended to the case where the number of polyene segments is small. A modification of the equations proposed in a previous report (AD-657 352) is required in this case. (Author)
AD-666 625 HC$3.00 MF$0.65

BRILLOUIN SCATTERING IN CARBON DIOXIDE IN THE CRITICAL REGION,
Johns Hopkins Univ Baltimore Md Dept of Physics
For primary bibliographic entry see Field 20M.
AD-666 636 Not available from CFSTI.

THEORY OF CHRONOPOTENTIOMETRY WITH CURRENT REVERSAL FOR MEASURING HETEROGENEOUS ELECTRON TRANSFER RATE CONSTANTS,
Michigan State Univ East Lansing Dept of Chemistry
Floyd H. Beyerlein, and Richard S. Nicholson. Feb 68, 6p
AROD-5288:4-C
Contract DA-31-124-ARO (D)-308
Availability: Published in Analytical Chemistry, v40 p286 Feb 1968.

Descriptors: (*Electrochemistry, Theory), Electrodes, Reaction kinetics, Equations, Electrical double layer, Electrons, Transport properties.

Theory of chronopotentiometry with current reversal is used to show that a system which behaves reversibly for some given current density can be made to exhibit kinetic behavior at higher current densitites, as indicated by a separation of cathodic and anodic quarterwave potentials. An equation is derived which relates this difference of quarterwave potentials to the standard rate constant for electron transfer. The method appears to provide a rapid and simple way to evaluate electrode kinetics. (Author)
AD-666 638 Not available from CFSTI.

STRUCTURE AND 73Ge COUPLING OF THE GeH3 RADICAL,
Duke Univ Durham N C Dept of Physics
George S. Jackel, Jorn J. Christiansen, and Walter Gordy. 15 Nov 67, 6p
AROD-4131:26
Grant DA-ARO (D)-31-124-G731
Availability: Published in The Journal of Chemical Physics, v47 n10 p4274-5 15 Nov 67.

Descriptors: (*Germanium compounds, *Free radicals), Electron spin resonance, Hyperfine structure, Molecular structure, Chemical bonds, Molecular orbitals, Hydrides.
Identifiers: Germanes.

The preparation of samples containing a 70% concentration of 73Ge isotope permitted the observation of the proton hyperfine structure and isotropic coupling of GeH3 free radicals. A pyramidal structure is indicated, with an HGeH bond angle of 115 deg. and a 11.5% hybridization of the Ge orbital.
AD-666 640 Not available from CFSTI.

A FLUORINE-19 NMR STUDY OF SOME DIADDUCTS OF TITANIUM TETRAFLUORIDE.
Air Force Materials Lab Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 7B.
AD-666 658 HC$3.00 MF$0.65

RESEARCH ON ELECTROSTATIC CHARGED DROPLET STREAMS.
Final rept. Oct 63-Jan 67,
TRW Systems Redondo Beach Calif
Ralph E. Wuerker. Oct 67, 174p Rept no. 99900-6299-R000
ARL-67-0211
Contract AF 33 (615)-1035

Descriptors: (*Drops, Electrostatics), (*Photographic techniques, Lasers), (*Lasers, Interferometers), Particles, Fluid dynamic properties, Hydrodynamics, Spark shadowgraph photography, Xenon lamps, Microphotography, Stereoscopic photography, Stability, Theory, Experimental data.
Identifiers: *Holography.

The research was concerned with the experimental and theoretical study of the charged particle emission from metal capillaries at high electrical voltage (10 kilovolts) and containing conducting oils under pressure. Experimental techniques employed and developed under the program included shadowgraph with the repetitively pulsed Xenon arc, conventional microscopy with Xenon arc illuminators, dark field imagery with Xenon arc, stero-shadowgraph with the Xenon arc, shadowgraph with the pulsed ruby laser, and holographic microscopy with pulsed ruby and continuous wave helium-neon laser illuminators. The experimental observations demonstrated that the conducting glycerin was pulled by the applied electric field into microscopic filaments which then underwent the classical electrohydrodynamic instabilities. A byproduct of the investigations on holographic microscopy was the discovery of pulsed laser holographic interferometry. (Author)
AD-666 669 HC$3.00 MF$0.65

THE ANISOTROPY OF THE POLARIZABILITY OF POLYENE SEGMENTS.
Technical rept.,
Massachusetts Univ Amherst Polymer Research Inst
Y. Shindo, and R. S. Stein. Feb 68, 19p
ONR-TR-99
Contract Nonr-3357 (01)

Descriptors: (*Polymers, Optical properties), (*Polyvinyl chloride, Birefringence), Molecular structure, Polarization, Molecular orbitals, Anisotropy, Molecular energy levels.
Identifiers: Polyenes.

The calculations of the longitudinal polarizabilities of polyenes are extended using a free-electron and Huckel-molecular orbital model in an effort to be able to predict the dependence of the birefringence of such molecules upon their orientation. (Author)
AD-666 684 HC$3.00 MF$0.65

X-RAY ABSORPTION SPECTROSCOPY AT THE COPPER K EDGE. OPTIMIZED PROCEDURES FOR GLASS MATERIALS,
Owens-Illinois Technical Center Toledo Ohio
For primary bibliographic entry see Field 11B.
AD-666 708 Not available from CFSTI.

NANOSECOND LASER PHOTOLYSIS AND SPECTROSCOPY: EXCITED SINGLET ABSORPTION IN 1,2-BENZANTHRACENE,
TRW Systems Redondo Beach Calif Quantum Physics Lab
J. R. Novak, and M. W. Windsor. 26 Feb 68, 8p
Rept no. 05824-6005-R000
Contract N00014-67-C-0327
Availability: To be published in Science. 8p n.d.

Descriptors: (*Lasers, Spectroscopy), (*Polycyclic compounds, Absorption spectrum), Molecular energy levels, Excitation, Photolysis, Instrumentation.
Identifiers: Benzanthracenes.

A laser technique was developed for obtaining photographic absorption spectra of transient chemical species with lifetimes in the nanosecond time range. The lowest excited singlet states of several aromatic hydrocarbons were observed in absorption for the first time. Detection with an image-converter camera provides time-resolved spectra. Extension of the technique to the picosecond range appears feasible. (Author)
AD-666 715 Not available from CFSTI.

LENINGRAD UNIVERSITY. HERALD, VOL. 19, NO. 22, PHYSICS AND CHEMISTRY SERIES, No 0. 4, 1964.
Foreign Technology Div Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 20H.
AD-666 727 HC$3.00 MF$0.65

RARE EARTH INFRARED LIFETIMES AND EXCITON MIGRATION RATES IN TRICHLORIDE CRYSTALS.
Technical rept.,
Johns Hopkins Univ Baltimore Md Dept of Physics
William B. Gandrud. Jan 68, 141p Rept no. TR-1
Contract DA-31-124-ARO (D)-339

Descriptors: (*Rare earth elements, *Infrared spectroscopy), (*Excitons, Rare earth compounds), Atomic energy levels, Relaxation time, Lanthanum compounds, Gadolinium compounds, Yttrium compounds, Chlorides, Crystal lattice defects, Ions, Stark effect, Quenching (Inhibition), Infrared detectors.
Identifiers: Gadolinium chloride, Lanthanum chloride, Yttrium chloride.

Lifetimes of trivalent rare earth ion levels below 14,000/cm were measured in the LaCl3, GdCl3, and YCl3 hosts, using the Infrared Quantum Counter and infrared fluorescence techniques. Because of their low radiative and multiphonon relaxation rates, these levels are well suited to concentration-quenching studies. Temperature dependences provide evidence that the ion pair decays of four levels in Pr (3+) and Nd (3+) occur resonantly (i.e., without phonon assistance) between excited Stark components. This enables the measured decay rates for these four levels to be used in estimating the rate for a single resonant transfer of all of the ion's energy to a neighboring ion. This latter process is the basic step of the excitation migration process. From the lifetimes of a number of levels which are quenched by migration of the excitation to 'sinks,' an estimate of 400,000 is obtained for the number of transfers that occur before a sink is reached. Levels quenched by migration to sinks are found to decay exponentially, with a lifetime which increases with increasing crystal purity. The roles of the various relaxation processes in determining the performance of the Infrared Quantum Counter as an infrared detector are discussed. (Author)
AD-666 791 HC$3.00 MF$0.65

RAMAN LINEWIDTHS FOR STIMULATED THRESHOLD AND GAIN CALCULATIONS.
Semi-annual rept. no. 5, 1 Jun 67-1 Jan 68,
Toronto Univ (Ontario) Dept of Physics
Boris P. Stoicheff, Walter R. L. Clements, Urs Bachmann, and Fujio Shimizu. Dec 67, 24p
Contract Nonr-5012 (00), ARPA Order-306
See also AD-654 726.

Descriptors: (*Raman spectroscopy, Liquids), Scattering, Surface properties, Lasers, Ruby, Interferometers, Excitation, Acetones, Nitrogen, Oxygen, Toluenes, Benzene, Experimental data.
Identifiers: Stimulated radiation, Carbon disulphide, Defender Project.

Linewidths in the normal Raman spectra of several liquids of interest in stimulated Raman scattering have been measured including carbon disulfide, benzene, toluene, oxygen and nitrogen. The spectra were excited with 6328 A radiation from a He-Ne laser and examined with a pressure-scanned Fabry-Perot interferometer. Anti-Stokes emission in sharply defined cones has been observed from fine filaments in a mixture of acetone with 5 to 10% CS2. The cone angle is in agreement with the momentum-matching condition that the longitudinal but not the transverse components sum to zero. (Author)
AD-666 820 HC$3.00 MF$0.65

MOLECULAR-WEIGHT DEPENDENCE OF VISCOELASTIC PROPERTIES OF POLYSTYRENE SOLUTIONS,
Oklahoma State Univ Stillwater Dept of Physics
George B. Thurston. 1 Nov 67, 11p
AROD-5275:6
Grant DA-ARO (D)-31-124-G682
Availability: Published in The Journal of Chemical Physics, v47 n9 p3582-8 Nov 1 1967.

Descriptors: (*Styrene plastics, Viscoelasticity), Polymers, Solutions, Molecular weight, Birefringence, Statistical distributions, Fluid flow.

Experimental data are analyzed to determine the molecular-weight dependence of viscosity and oscillatory flow birefringence of polystyrene solutions in a partially chlorinated diphenyl solvent. Results for polystyrenes in the molecular weight range from 10,000 to 1,000,000 are given for the steady-flow intrinsic viscosity, the high- and low-frequency limits of the complex coefficient of viscosity for oscillatory flow, and the frequency dependence of the oscillatory flow birefringence. These properties are compared with the results of the theory for the flexible noninteracting Gaussian chain model composed of a finite number of chain segments and including hydrodynamic interaction within the chain as well as internal viscosity. The intrinsic viscosity is independent of the internal viscosity while the viscosity and birefringence in oscillatory flow are dependent on all factors. The three experimental properties are sufficient to determine the values of the parameters of the theory after correction for finite concentration effects. Over the complete molecular weight range studied it is found that approximately the number of monomer units per segment of the model is 10, the length of the segment is 0.0000003 cm, the ratio of the internal viscosity coefficient to segmental friction factor is 2.0, and the segmental hydrodynamic interaction factor is 0.3. The character of the measured properties and the theoretical results are in agreement. (Author)
AD-666 864 Not available from CFSTI.

ELECTRON-TEMPERATURE DEPENDENCE OF ELECTRON-ION RECOMBINATION IN NEON,
Pittsburgh Univ Pa Dept of Physics
Lothar Frommhold, Manfred A. Biondi, and F. J. Mehr. 2 Aug 67, 12p
AROD-3187:9
Grant DA-ARO (D)-31-124-G965
Availability: Published in The Physical Review, v165 n1 p44-52 Jan 5 1968.

Descriptors: (*Neon, *Recombination reactions), (*Ionosphere, Afterglows), Dissociation, Diffusion, Gas ionization, Simulation, Resonant frequency, Electron density, Microwaves, Heat transfer.
Identifiers: Electron temperature.

A 3-mode microwave apparatus is used to determine electron-ion diffusion and recombination rates under conditions such that T (+) = T (gas) = 300 degrees K and T sub e is varied from 300 to 11,000 degrees K. A high-Q cavity mode is used to ionize the gas, a second high-Q mode is used to determine the electron density during the afterglow from the change of resonant frequency of the cavity, and a nonresonant waveguide mode is used to apply a constant microwave heating field to the electrons. At T sub e = 300 degrees K and p (Ne) = 20 Torr, a value alpha (Ne sub 2, superscript +) = (1.7 plus or minus 0.1) x 10 to the -7th power cm cubed/sec is obtained from analysis of the recombination-controlled electron density decays, using a computer solution of the electron continuity equation to take into account ambipolar diffusion effects. This value is in very good agreement with corrected values obtained by several other investigators. Using the same procedures, a variation of alpha (Ne sub 2, superscript +) as (T sub e) to the -0.43 power is found to be accurately obeyed over the range 300 degrees K = or < T sub e = or < 11,000 degrees K, suggesting that the initial capture step is rate-limiting in the dissociative recombination process. (Author)
AD-666 876 Not available from CFSTI.

ATOMIC-SHELL STRUCTURE IN INELASTIC COLLISIONS,
Pittsburgh Univ Pa Dept of Physics
J. D. Garcia. 1 Nov 67, 5p
AROD-6563:6
Contract DA-31-124-ARO (D)-440, ARPA Order-0826
Availability: Published in The Journal of Chemical Physics, b47 n9 p3679-80 Nov 1 1967.

Descriptors: (*Atomic orbitals, Inelastic scattering), Ionization, Alkali metals, Electron bombardment, Probability.

Some distinguishable aspects of the effects of atomic-shell structure in the ionization of atoms by charged projectiles are examined. In particular, the dependence on incident energy in ionizing collisions is generally characterized by a monotonic rise from threshold to maximum, followed by a monotonic decrease thereafter, almost independent of the atomic or molecular system involved. One set of exceptions to this is ionization of alkali atoms by electron impact, in which effects of shell structure are evident. The conditions for such behavior are explored and generalized. (Author)
AD-666 877 Not available from CFSTI.

ELECTROLYTIC REDUCTION OF CARBON DIOXIDE ON LEAD CATHODES,
Utah Univ Salt Lake City Inst for the Study of Rate Processes
Terrell N. Andersen, Bryant A. Miner, Ella Dibble, and Henry Eyring. Oct 67, 19p
AROD-3383:7
Contracts DA-31-124-ARO (D)-408, AT (11-1)-1144
Availability: Published in Unidentified Journal.

Descriptors: (*Carbon dioxide, Electrochemistry), Electrolysis, Reduction (Chemistry), Cathodes (Electrolytic cell), Lead, Reaction kinetics, Formic acids.

Reduction of alkali chloride and alkali carbonate aqueous solutions containing CO2, N2 and H2 was carried out on lead cathodes in the acidic and neutral pH range. Steady state polarization curves from the rest potential up to -2.1 volts (vs the N.H.E.) showed five regions with increasing current: (i) a region in which impurities controlled the kinetics; (ii) a region in which reduction of H3O (+) ions is the rate controlling step, and in which mostly H2 and a small percentage of formic acid are the products; (iii) a limiting current region for H3O (+) ions; (iv) a region in which water and carbon dioxide are reduced, and in which the current efficiency for production of HCOOH is greater than 50 per cent; (v) another limiting current region in which OH (-) transport away from and CO2 transport to the electrode influence the kinetics of region (iv). Possible reaction paths and mechanisms are postulated for the cathodic reduction of CO2. (Author)
AD-666 880 Not available from CFSTI.

THE KINETICS OF THE REDUCTION OF t-BUTYL CHLORIDE AND t-BUTYL BROMIDE BY ORGANOTIN HYDRIDES.

National Research Council of Canada Ottawa (Ontario) Div of Applied Chemistry
D. J. Carlsson, and K. U. Ingold. 27 Nov 67, 2p
NRC-9987
Availability: Published in Journal of the American Chemical Society, v90 p1055-6 Feb 1968.

Descriptors: (*Halogenated hydrocarbons, Reduction (Chemistry)), Tin compounds, Metalorganic compounds, Hydrides, Bromine compounds, Chlorine compounds, Reaction kinetics, Canada.
Identifiers: Butyl bromides, Butyl chlorides.

An examination was made of the reaction of t-butyl chloride and bromide with tri-n-butyltin hydride and triphenyltin hydride in cyclohexane at 25C. The reaction was initiated photochemically. The rates of reaction were estimated from the heat of the over-all process R'3SnH + RX to R'3SnX + RH + Heat.
AD-666 885 Not available from CFSTI.

STRESS EFFECTS ON THE PARAMAGNETIC RESONANCE OF Yb (3+) IN ThO2 AND Ho (2+) IN CaF2,
California Univ Los Angeles Dept of Physics
Z. Sroubek, M. Tachiki, P. H. Zimmermann, and R. Orbach. Jan 68, 12p
Contract Nonr-233 (88)
Availability: Published in The Physical Review, v165 n2 p435-46 10 Jan 68.

Descriptors: (*Ytterbium, Paramagnetic resonance), (*Holmium, Paramagnetic resonance), (*Crystal lattice defects, *Paramagnetic resonance), Calcium fluorides, Thorium compounds, Dioxides, Stresses, Nuclear spins, Hamiltonian, Hartree-Fock approximation, Chemical bonds, Atomic energy levels.
Identifiers: Thorium oxide.

To clarify this problem and to gain new information, EPR experiments were performed on the rare earth ions Yb (3+) in ThO2 and Ho (2+) in CaF2 in the presence of external stresses. The experiments were carried out at 4 and 1.2K, using a 35-kMc/sec EPR spectrometer with provision for stressing the crystal perpendicularly to the static magnetic field. The external pressure significantly altered the EPR spectra. The observed changes were interpreted in terms of the stress dependences of the g factor and the hyperfine interaction parameter A. A theoretical analysis of the shifts of g and A was carried out, and was based on an electrostatic model of the stress-induced changes in the crystalline field. For both ions investigated the stress-induced crystalline field mixes the ground state with excited states, with corresponding changes in g and A. These changes can be obtained from a perturbation calculation of the crystalline field and the Zeeman energy, and the crystalline field and the hyperfine interaction, respectively.
AD-666 887 Not available from CFSTI.

CLASSICAL APPROXIMATION FOR IONIZATION BY PROTON IMPACT,
Pittsburgh Univ Pa Dept of Physics
J. D. Garcia, E. Gerjuoy, and Jean E. Welker. 5 Jan 68, 10p
AROD-6563:7
Contract DA-31-124-ARO (D)-440, ARPA Order-0826
Prepared in cooperation with National Aeronautical Space Administration, Goddard Space Flight Center, Greenbelt, Md., contract NGR-39-011-035.
Availability: Published in The Physical Review, v165 n1 p66-72 Jan 5 1968.

Descriptors: (*Gas ionization, *Proton bombardment), Helium group gases, Alkali metals, Electrons, Inelastic scattering, Probability, Atomic orbitals, Approximation (Mathematics).

Ionization of atoms by proton impact, as predicted by the classical binary-encounter approximation, is examined and compared with available experimental data on the noble-gas and alkali-metal atoms. The results indicate that these predictions agree with observation to within a factor of 2 or 3, and are as reliable as the comparable results for electron ionization. Comparisons are made between electron and proton ionization cross sections. The proton ionization curves all have a single maximum and are otherwise monotonic, in contrast to electron ionization, where the effects of atomic shell structure produce secondary maxima for some atoms. The effect of averaging over bound-state speed distributions is discussed, and is found to be much less important for protons than for electrons, except at very low proton energies. The need for experimental measurements at higher energies is discussed. (Author)
AD-666 889 Not available from CFSTI.

COMPARISON BETWEEN EXPERIMENTAL AND CALCULATED SPECTRA OF CARBON DIOXIDE AND WATER VAPOR,
Denver Univ Colo Dept of Physics
Thomas G. Kyle. Feb 68, 31p Rept. no. Scientific-7
AFCRL-68-0105
Contract AF 19 (628)-5202, ARPA Order-363

Descriptors: (*Carbon dioxide, *Infrared spectroscopy), (*Water vapor, Infrared spectroscopy), Band spectrum, Numerical analysis, Atmosphere, Absorption spectrum.

Line by line calculations of absorption spectra were carried out for the 2.0 and the 2.7 micron bands of carbon dioxide and for the 2.7 micron band of water vapor. The parameters for these calculations are taken from published listings for these bands. The calculations are compared with experimental data of the same spectral resolution, this being a fraction of a wavenumber. The comparisons show the line positions to be in good agreement with the experimental data. The 2.0 micron bands of carbon dioxide differ from the calculations by a small amount, but adjustment of parameters is required for the experimental and calculated values to agree in the 2.7 micron bands of carbon dioxide. There are large differences between calculated and experimental spectra in the 2.7 micron band of water vapor throughout much of the spectra. (Author)
AD-666 929 HC$3.00 MF$0.65

STUDY OF COLLISION PROCESSES IN GASEOUS PLASMAS.
Minnesota Univ Minneapolis Dept of Electrical Engineering
For primary bibliographic entry see Field 20I.
AD-666 946 HC$3.00 MF$0.65

THEORETICAL PREDICTION OF THE STIMULATED THERMAL RAYLEIGH SCATTERING IN LIQUIDS,
Pennsylvania State Univ University Park Dept of Physics
For primary bibliographic entry see Field 20F.
AD-666 952 Not available from CFSTI.

SATURATION EFFECTS IN STIMULATED RAYLEIGH-WING SCATTERING,
Pennsylvania State Univ University Park Dept of Physics
For primary bibliographic entry see Field 20F.
AD-666 954 Not available from CFSTI.

A NEW THEORETICAL METHOD FOR THE ACCURATE CALCULATION OF EXPECTATION VALUES ON FUCTIONS OF INTERNUCLEAR SEPARATION IN SINGLET SIGMA-STATE DIATOMIC MOLECULES,
Pennsylvania State Univ University Park Dept of Physics
R. M. Herman, and S. Short. 1966, 31p
Contract N00014-67-A-0385-001

Descriptors: (*Molecular energy levels, Diatomic molecules), (*Hydrogen, Molecular energy levels), Functions, Numerical analysis, Potential energy, Chemical bonds, Integrals.

A new theoretical method for the calculation of expectation values on singlet Sigma-state diatomic molecular vibration-rotation states is developed. Using Dunham's theory of vibration-rotation energies, each integral can be expressed as a rapidly converging series of terms, each of which is given to high accuracy as an analytical function of the internuclear potential parameters. Results are presented which allow the rapid calculation of expectation values on any arbitrarily specified algebraic function of intermolecular separation, complete to four orders in the ratio of the rotational to vibrational constant of the molecule. The method is applied to a review and extension of the theoretical calculation of rotational energies in H2.
AD-666 981 HC$3.00 MF$0.65

DIELECTRIC AND OPTICAL PROPERTIES OF CRYSTALLINE ARGON.
Technical research article,
Frankford Arsenal Philadelphia Pa Pitman-Dunn Research Labs
I. Lefkowitz, K. Kramer, M. A. Shields, and Gerald L. Pollack. Nov 67, 10p
FA-A67-19
Availability: Published in Journal of Applied Physics, v38 n12 p4867-73 Nov 67.

Descriptors: (*Solidified gases, Dielectric properties), (*Argon, Optical properties), Isotropism, Crystal growth, Anisotropy, Refraction, Crystal lattices, Polarization, Light, Electrooptics, X-ray diffraction analysis, Photographs.

Studies of the crystal optics, dielectric properties from 10Hz to 10kHz, and the electro-optical properties of crystalline argon, grown with a modified Bridgman technique, are reported. The optical character of the solids was examined using polarized light, with varying crystal growth parameters, viz., rate, annealing, and pressure. Using crossed polaroids to examine the transparent crystals, theree basic kinds of optical regions were observed: optically isotropic, optically anisotropic (birefringent), and sharp, horizontal, alternate isotropic and anisotropic striations. Low-order strain birefringence with broad and diffuse patterns is also described. The observations are considered in terms of impurity segregation and strain effects and it is concluded, with support from annealing and electro-optic studies up to 40 kV/cm, that the birefringent regions have hcp structure and the isotropic regions have fcc structure. The dielectric constant (epsilon) was directly measured for solid argon between two concentric stainless-steel cylinders in a three-terminal network that minimized stray fields. It was found that epsilon = 1.586 over the entire frequency range with an estimated experimental error of 2%. Variation of epsilon with growth rate and annealing qualitatively supports the optical observations on hcp and fcc structure. (Author)
AD-666 982 Not available from CFSTI.

ON THE ELASTIC CONSTANTS OF POLYCRYSTALLINE ARGON.
Interim rept.,
Rutgers - the State Univ New Brunswick N J Dept of Physics
Carl Feldman, and Michael L. Klein. Jan 68, 8p
AFOSR-68-0622
Grant AF-AFOSR-726-65
Revision of report dated 3 Jul 67.
Availability: Published in Philosophical Magazine, v17 n145 p135-40 Jan 68.

Descriptors: (*Solidified gases, Argon), (*Argon, Elasticity), Poissons ratio, Cryogenics, Temperature, Mechanical waves, Molecular association, Theses.
Identifiers: Elastic constants, Bulk modulus, Shear modulus.

The explicit temperature dependence of the second order elastic constants of the FCC lattice

with arbitrary nearest neighbour central forces is used to calculate the bulk modulus, polycrystalline shear modulus and the polycrystalline longitudinal wave velocity of argon. The numerical calculations are based on a Mie-Lennard Jones (12-6) potential and cover the range 0<T<60 degrees K. There is reasonable agreement with the available experimental data. (Author)
AD-667 007 Not available from CFSTI.

MASS SPECTROMETRIC INVESTIGATION OF ION-MOLECULE REACTIONS IN CYCLOHEXANE,
Aerospace Research Labs Wright-Patterson AFB Ohio
Fred P. Abramson, and Jean H. Futrell. Jan 68, 10p Rept no. ARL-68-0008
Availability: Published in Journal of Physical Chemistry, v71 n12 p3791-6 Nov 1967.

Descriptors: (*Cyclohexanes, Mass spectroscopy), Ions, Chemical reactions, Probability, Tracer studies, Exchange reactions.
Identifiers: *Ion-molecule reactions.

The various ion-molecule reactions of fragment ions produced from cyclohexane were investigated in conventional high-pressure mass spectrometers as well as in a tandem mass spectrometer. The results from the single-stage instruments showed that (i) all fragment ions with less than six carbon atoms react with cyclohexane, (ii) the major secondary ions are C6H11 (+) and C6H10 (+) with minor amounts of C4H9 (+), (iii) C4H8 (+) and C3H6 (+) fragment ions react in a similar way to 1-butene and propylene parent ions, respectively, and (iv) there is a net charge exchange reaction of parent ions which will cause the ratio of isotopically substituted cyclohexane ions to differ considerably from the ratio of the neutral molecules in an isotopically mixed system. All fragment ions react via the hydride transfer reaction, R (+) + C6H12 (+) RH + C6H11 (+), and C3H6 and C4H8 (+) ions also abstract H2 (-) to product C6H10 (+). (Author)
AD-667 023 Not available from CFSTI.

THERMODYNAMICS OF POLYMORPHIC TRANSFORMATIONS IN SILICA. THERMAL PROPERTIES FROM 5 TO 1070K AND PRESSURE-TEMPERATURE STABILITY FIELDS FOR COESITE AND STISHOVITE.
Chicago Univ Ill Dept of Chemistry
For primary bibliographic entry see Field 8G.
AD-667 030 Not available from CFSTI.

THE IONIZATION POTENTIAL AND HEAT OF FORMATION OF THE (CH3)2N RADICAL BY MASS SPECTROMETRY,
Rocket Propulsion Establishment Westcott (England)
I. P. Fisher, and E. Henderson. Mar 67, 16p Rept no. RPE-TR-67/4

Descriptors: (*Free radicals, Mass spectroscopy), Dimethyl hydrazine (1-1), Amines, Pyrolysis, Ionization potentials, Heat of formation, Dissociation, Great Britain.

The ionization potential of the (CH3)2N radical, obtained by pyrolysis of 1.1.dimethylhydrazine and of dimethylnitrosamine, was determined directly as 9.42 plus or minus 0.1 eV. The heat of formation of ((CH3)2N) was calculated to be 30.3 plus or minus 2 kcal/mole. This figure agrees with the kinetic value thus resolving the discrepancy between the latter and previous electron impact values. Electron affinities were obtained as follows: EA (NH2) = 1.05 plus or minus 0.1 eV and EA (NO) = 0.8 plus or minus 0.1 eV. (Author)
AD-667 033 HC$3.00 MF$0.65

LOW-TEMPERATURE HEAT CAPACITY OF LITHIUM TETRAMMINE,
Texas Univ Austin Dept of Physics
J. A. Morgan, and J. C. Thompson. 1967, 7p
Contract Nonr-3734 (00)
Research supported in part by NSF.
Availability: Published in The Journal of Chemical Physics, v47 n11 p4607-11 Dec 1 1967.

Descriptors: (*Lithium compounds, *Thermochemistry), (*Nitrogen compounds, Specific heat), Cryogenics, Transition temperature, Electrical conductance, Cesium, Cryostats.
Identifiers: Ammines, Lithium tetrammine, Heat capacity, Debye temperature.

The heat capacity of lithium tetrammine--Li (NH3)4--was measured over the temperature range 2-4K using a nonadiabatic, heat-burst technique. The Debye characteristic temperature TD was found to be 54.9 plus or minus 0.9K. Due to the low electron density and to the low TD no significant value could be determined for the electronic specific heat. The 'ideal' electrical resistivity was calculated from the TD quoted above and the rho (TD) reported by McDonald and Thompson using the Bloch-Gruneisen theory. Excellent agreement with experiment was found. The specific heat of 99.9% pure cesium metal was also measured from 2.1 to 4.2K as a test of the apparatus and TD found to be 38.5 plus or minus 1.0K in agreement with previous work. (Author)
AD-667 042 Not available from CFSTI.

QUANTITATIVE REFLECTION ELECTRON DIFFRACTION IN AN ULTRA HIGH VACUUM CAMERA,
Cornell Univ Ithaca N Y Dept of Engineering Physics
Benjamin M. Siegel, and James F. Menadue. 1967, 13p
AFOSR-68-0557
Contract SD-68, Grant AF-AFOSR-770-65
Availability: Published in Surface Science v8 p206-16 1967.

Descriptors: (*Electron diffraction analysis, Cameras), Vacuum apparatus, Intensity, Reflection, Surface properties, Accuracy, Energy.
Identifiers: *Vacuum cameras.

An ultra high vacuum electron diffraction camera for intermediate energies (10-50 kV) is described. A Faraday cup scans the diffraction pattern while another monitors the incident beam, reading out the intensities with high accuracy. The performance of the instrument is illustrated with typical diffraction patterns and scans. Reasons are discussed for expecting that the intensity data from high-energy electron diffraction is more satisfactory than from low-energy electron diffraction for the determination of surface structure, since dynamical theory must be used. (Author)
AD-667 050 Not available from CFSTI.

NUCLEAR QUADRUPOLE RESONANCE INVESTIGATION OF NdBr3 AND UI3.
Scientific Interim rept.,
Florida State Univ Tallahassee Dept of Physics
S. I. Parks, and W. G. Moulton. 12 Mar 68, 3p
AFOSR-68-0556
Grant AF-AFOSR-928-67
Availability: Published in Physics Letters, v26A n2 p63-4 Dec 67.

Descriptors: (*Neodymium compounds, *Nuclear magnetic resonance), (*Uranium compounds, Nuclear magnetic resonance), Bromides, Iodides, Single crystals, Paramagnetic resonance, Antiferromagnetism.
Identifiers: Neodymium bromide, Uranium triiodide.

The 79Br and 81Br quadrupole spectra in a single crystal of NdBr3 in the paramagnetic state and the 127I quadrupole spectrum in polycrystalline UI3 in both the paramagnetic and antiferromagnetic states were studied. (Author)
AD-667 062 Not available from CFSTI.

ANIONIC COPOLYMERIZATION OF STYRENE AND ISOPRENE IN CYCLOHEXANE.
Revised ed.,
National Research Council of Canada Ottawa (Ontario) Div of Applied Chemistry
D. J. Worsfold. 2 May 67, 7p
NRC-9848
Revision of report dated 15 Mar 67.
Availability: Published in Journal of Polymer Science, v5 PtA-1 p2783-9 1967.

Descriptors: (*Styrenes, Copolymerization), (*Isoprene, Copolymerization), (*Copolymerization, Reaction kinetics), Catalysts, Lithium compounds, Metalorganic compounds, Ultraviolet spectroscopy, Styrene plastics, Elastomers, Synthesis (Chemistry), Canada.

The copolymerization of isoprene with styrene initiated with sec-butyllithium in cyclohexane solution was studied by kinetic methods. The rates of the homopolymerization were measured by normal methods. The rates of the cross-propagation reactions were measured by the rate of appearance or disappearance of the ultraviolet absorption of polystyryllithium when the individual chain ends were reacted with the opposite monomer in the absence of the first. The rates of some of the reactions were also measured in the presence of the other monomer. It was found that polyisoprenyllithium reacted with both monomers with a one quarter-order dependence, and the polystyryl-lithium with a one half-order dependence. It was found possible to describe the copolymerization in terms of the four individual rate constants and to predict the initial copolymer composition. It was not found necessary to resort to explanations based on preferentail absorption of isoprene around the chain ends to explain the high isoprene content of the copolymer. (Author)
AD-667 069 Not available from CFSTI.

ORIENTATION-DEPENDENT STICKING COEFFICIENT IN THE GERMANIUM-OXYGEN SYSTEM,
IBM Watson Research Center Yorktown Heights N Y
R. F. Lever. Feb 68, 7p
AFOSR-68-0555
Contract AF 49 (638)-1201
Availability: Published in Surface Science, v9 p370-3 Feb 1968.

Descriptors: (*Germanium, Oxidation), Oxygen, Chemisorption, Germanium compounds, Oxides, Vapors, Mass spectroscopy, Surface properties.
Identifiers: Germanium monoxide, Sticking coefficients, Surface chemistry.

A drop in sticking coefficient of oxygen was found to occur on Ge (111) surfaces, under conditions where the surface may be expected to be clean, at approximately 750C. No such behavior was observed with surfaces of (100) or (110) orientation. Possible causes for the observed phenomenon are discussed. (Author)
AD-667 101 Not available from CFSTI.

TETRAGONAL CRYSTAL-FIELD ENERGY LEVELS--CaF2:Sm3+ AND CdF2:Sm3+.
Army Electronics Command Fort Monmouth N J Inst for Exploratory Research
For primary bibliographic entry see Field 20B.
AD-667 105 Not available from CFSTI.

DYNAMIC ENHANCEMENT OF FLUORINE NUCLEAR MAGNETIC RESONANCE SIGNALS. SOME EFFECTS OF CHEMICAL ENVIRONMENT,
Army Electronics Command Fort Monmouth N J Inst for Exploratory Research
James R. Stewart, Edward H. Poindexter, and Joseph A. Potenza. 8 May 67, 6p
Availability: Published in Journal of the American Chemical Society, v89 n24 p6017-21 Nov 22 1967.

Descriptors: (*Fluorine compounds, *Nuclear magnetic resonance), (*Halogenated hydrocarbons, Nuclear magnetic resonance), Free radicals, Solutions, Nuclear moments, Polarization, Molecular orbitals, Aromatic compounds, Complex compounds.

Dynamic polarization of fluorine nuclei in free-radical solutions (diphenylpicrylhydrazyl and galvinoxyl) was studied for a selection of fluorocarbons of different chemical nature. The observed nmr enhancements and the amount of scalar coupling, due to electron density at the F nucleus, are shown to vary considerably upon change of radical or fluorocarbon. Aromatic fluorocarbons always show higher scalar rates than do saturated compounds. The halo-substituted fluorobenzenes show regular trends indicative in part of complicated pi-system interactions. Exchange polarization, after the manner of coupling on free radicals, and complex formation appear to be the dominant mechanisms producing the observed effects. (Author)

AD-667 110 Not available from CFSTI.

DYNAMIC POLARIZATION OF FLUORINE NUCLEI IN SOLUTIONS OF SELECTED FREE RADICALS,

Army Electronics Command Fort Monmouth N J Inst for Exploratory Research

Edward H. Poindexter, James R. Stewart, and Philip J. Caplan. 15 Oct 67, 13p

Availability: Published in The Journal of Chemical Physics, v47 n8 p2862-73 15 Oct 67.

Descriptors: (*Fluorine compounds, Nuclear magnetic resonance), (*Halogenated hydrocarbons, Nuclear magnetic resonance), (*Free radicals, Interactions), Solutions, Benzenes, Alkanes, Nuclear moments, Polarization, Molecular orbitals, Stereochemistry, Paramagnetic resonance.

Identifiers: Hexafluoro benzenes, Trichloro trifluoro ethanes.

Dynamic polarization of fluorine nuclei was examined with 14 free radicals dissolved in hexafluorobenzene (C6F6) and 1,1,1-trifluoro-2,2,2-trichloroethane (CF3CCl3). The radicals may be broadly grouped by their tendency to produce either positive or negative fluorine NMR enhancement. A large positive enhancement indicates that Fermi-contact coupling between the nucleus and the radical electron is the dominant nuclear relaxation mechanism; a large negative enhancement indicates that dipolar coupling is dominant. The correlation times for dipolar and contact relaxation components are comparable, and approximately the values expected from molecular diffusion. The intermolecular contact coupling may be transmitted by exchange polarization of bonding electrons on the fluorocarbon, or by charge transfer between radical and fluorocarbon, or by a combination of both mechanisms. Steric shielding appears to weaken the contact interaction in certain cases; but it is not the sole physical influence governing the contact coupling, nor even necessarily the most important one. The highest fluorine NMR enhancements observed at 74 G were -220 for CF3CCl3 with 2,4,6-tritertiary butyl phenoxyl, and +260 for C6F6 with 2,4,6-triphenyl pyrylyl in acetone. (Author)

AD-667 112 Not available from CFSTI.

ENERGY TRANSFER BETWEEN EU2+ AND HO3+ IONS IN CaF2,

Army Electronics Command Fort Monmouth N J Inst for Exploratory Research

For primary bibliographic entry see Field 20E.

AD-667 113 Not available from CFSTI.

ELECTRONIC STRUCTURE AND STABILITY OF THE INORGANIC FULMINATES,

Cambridge Univ (England) Cavendish Lab

For primary bibliographic entry see Field 7B.

AD-667 129 Not available from CFSTI.

THE ACID-CATALYZED AQUATION OF THE ALPHA-OXALATO TRIETHYLENETETRAMINE CHROMIUM (III) ION.

Frank J Seiler Research Lab United States Air Force Academy Colo

For primary bibliographic entry see Field 7B.

AD-667 177 Not available from CFSTI.

KINETICS OF NYLON AND PHENOLIC PYROLYSIS.

Lockheed Missiles and Space Co Sunnyvale Calif

For primary bibliographic entry see Field 11I.

AD-667 181 HC$3.00 MF$0.65

INDUSTRIAL METHOD OF X-RAY FLUORESCENCE ANALYSIS OF HIGH-STRENGTH STEELS.

Final rept.,

Army Tank-Automotive Center, Warren, Mich. Components Research and Development Labs.

D. W. Bowman, and R. J. Rodgers. Mar 67, 40p

ATAC-TR-9645

Descriptors: (*Quantitative analysis, X-ray spectroscopy), (*X-ray spectroscopy, Fluorescence), (*Steel, Quantitative analysis), (*Calibration, Quantitative analysis), Industrial research, Tool steel, Stainless steel, Vanadium, Chromium, Manganese, Iron, Cobalt, Nickel, Copper, Molybdenum, Tungsten.

Identifiers: *Calibration curves, XRD-3 diffractometer, X-ray fluorescent.

A potential method of quantitative analysis of high-strength steels by x-ray fluorescence was investigated. A technique for measuring composition is described in the report. Tool steel, stainless steel, and high temperature alloys of widely varying composition did not provide calibration curves capable of the precision desired. Preparation of calibration curves for each type of alloy is considered necessary for precision in quantitative analysis. (Author)

AD-819 164 HC$3.00 MF$0.65

SEPARATION AND PURIFICATION SECTION: SUMMARY OF INITIAL ACTIVITIES, FEBRUARY 1966 THROUGH JUNE 1967,

National Bureau of Standards, Washington, D. C. Analytical Chemistry Div.

David H. Freeman. Feb 68, 51p

Hard copy available from Superintendent of Documents, GPO, Washington, D. C. 20402 $0.35 as C13.46.429.

Descriptors: (*Chemical analysis, Reviews), Separation, Purification, Ion exchange, Zone melting, Crystallization, Organic compounds, Calorimetry.

The report describes the initial growth and research activities of the Separation and Purification Section since its formal organization in February, 1966. A research capability for the study and refined adaptation of ion exchange materials is described. There are new activities reported for the areas of extreme purification, chemical reagents, organic chemicals, including the use of crystallization for the achievement, protection, and measurement of chemical purity. Specific studies were conducted in the purification of mineral acids, nitrobenzene, and the development of zone refining methods. (Author)

NBS-TN-429 HC$0.35 MF$0.65

PROPERTIES AND APPLICATIONS OF MOLECULAR FORCES.

Uber Einege Eigenschaften Und Anwendungen Der Molekularkrafte

Aztec Scnool of Languages, Inc., Acton, Mass. F. London. Mar 68, 28p NASA-TT-F-11497

Contract NASW-1692

Coll- 28 P Refs Tran- Transl. Into English From Z. Physik. Chem. (Frankfurt), V. 11, 1930 P 222-251

Descriptors: *Chemical bonds, *Intermolecular forces, *Molecular interactions, *Molecular structure, *Optical properties, Approximation, Attraction, Dispersion, Molecular theory, Profiles, Spectrum analysis.

For abstract, see STAR 06 09.

N68-18493 HC$3.00 MF$0.65

BUBBLE FORMATION AND GROWTH. STUDY OF THE BOUNDARY CONDITIONS AT A LIQUID-VAPOR INTERFACE THROUGH IRREVERSIBLE THERMODYNAMICS QUARTERLY PROGRESS REPORT, SEP. - NOV. 1967.

Massachusetts Inst. of Tech., Cambridge. Dept. of Mechanical Engineering.

R. K. Sakhuja. Jan 68, 72p NASA-CR-61628

Contract NAS8-20013

Descriptors: *Condensates, *Dynamic models, *Liquid-vapor equilibrium, *Phase transformations, *Reaction kinetics, *Thermodynamic properties, Diffusion coefficient, Heat transfer, Liquefaction, Mercury (metal).

For abstract, see STAR 06 09.

N68-18630 HC$3.00 MF$0.65

ELEMENTARY EXCITATIONS IN PI-ELECTRON MOLECULES.

Uppsala Univ. (Sweden). Quantum Chemistry Group.

J. Linderberg, and Y. Oehrn. 1 Apr 67, 24p SR-31, AFOSR-68-0118

Contract AF 61/052/-874

Descriptors: *Excitation, *Molecular energy levels, *Molecular orbitals, Approximation, Decoupling, Equations of motion, Green function, Matrices (mathematics), Quantum theory.

For abstract, see STAR 06 09.

N68-18738 HC$3.00 MF$0.65

THE ANGULAR DISTRIBUTION OF SCATTERED AND SPUTTERED 40 KE V PARTICLES ON POLYCRYSTALLINE TARGETS.

Oesterreichische Studiengesellschaft Fuer Atomenergie G.M.B.H., Seibersdorf.

For primary bibliographic entry see Field 20H.

For abstract, see STAR 06 09.

N68-18858 HC$3.00 MF$0.65

THE INFLUENCE OF THE SEQUENCE LENGTH DISTRIBUTION ON THE UPPER MELTING RANGE OF COPOLYMERS.

Einfluss Der Sequenzlangenverteilung Auf Das Schmelz-ende Von Copolymeren

Royal Aircraft Establishment, Farnborough (England).

H. Baur. Nov 67, 11p RAE-LIB-TRANS-1263

Tran- Transl. Into English From Makromol. Chem. (Heidelberg), V. 98, 1966 Coll- 297-300

Descriptors: *Copolymers, *Melting points, Butenes, Ethylene, Pentanes, Polymerization, Propylene, Variations.

For abstract, see STAR 06 09.

N68-19060 HC$3.00 MF$0.65

GROUND STATE OF SOLID NEON.

Laboratoire de Physique Theorique Et des Hautes Energies, Orsay (France).

J. P. Hansen. Jan 68, 16p TH/68-1

Descriptors: *Energy levels, *Ground state, *Neon, Calculus of variations, Density distribution, Distribution functions, Lattice parameters, Monte carlo method, Pressure distribution, Wave functions.

For abstract, see STAR 06 09.

N68-19337 HC$3.00 MF$0.65

KINETIC RESEARCH ON SUBSTITUTED NITRO-BENZENE RADICAL ANIONS USING ELECTRON SPIN RESONANCE.
Kinetische Untersuchungen An Substituierten Nitrobenzolradikalanione
n Mit Hilfe Der Elektronenspinresonanz
Technische Hochschule Munchen (West Germany).
W. H. Wirths. 24 Jul 67, 73p
Lang- in German

Descriptors: *Anions, *Electron paramagnetic resonance, *Nitrobenzenes, *Reaction kinetics, Benzoic acid, Bibliographies, Chemical reactions, Hyperfine structure, Radicals, Time constant.

For abstract, see STAR 06 09.
N68-19339 HC$3.00 MF$0.65

PHOTOCHEMICAL AND REDOX PROCESSES ON CADMIUM SULFIDE ELECTRODES.
Photochemische Und Redox Prozesse An Cadmiumsulfid Elektroden
Technische Hochschule Munchen (West Germany).
R. Haberkorn. 1967, 56p
Lang- in German

Descriptors: *Cadmium sulfides, *Electrodes, *Photochemical reactions, *Reduction (chemistry), Crystal lattices, Crystal surfaces, Electrochemical corrosion, Electrode film barriers, Electrodissolution, Electrolysis.

For abstract, see STAR 06 09.
N68-19393 HC$3.00 MF$0.65

AN ATTEMPT TO MEASURE OBJECTIVELY THE QUALITY OF AIR.
National Swedish Inst. for Building Research, Stockholm (Sweden).
For primary bibliographic entry see Field 13B.
PB-177 763 HC$3.00 MF$0.65

7E. Radio and Radiation Chemistry

INVESTIGATION OF THE PHOTOPOLYMERIZATION PROCESS.
General Aniline and Film Corp., Binghamton, N. Y. Photo and Repro Div.
For primary bibliographic entry see Field 7C.
AD-484 544 HC$3.00 MF$0.65

PHOTOCHEMICAL ISOMERIZATION AND RADICAL FRAGMENTATION OF 10-HYDROXYMETHYL- (DELTA-1,9)-2-OCTALONE,
New York Univ N Y Dept of Chemistry
David I. Schuster, and Donald F. Brizzolara. 1967, 7p
AROD-4019:13
Grant DA-ARO (D)-31-124-G901
Availability: Published in Chemical Communications, p1158 1967.

Descriptors: (*Ketones, *Photochemistry), Cycloalkenes, Polycyclic compounds, Molecular isomerism, Photolysis, Excitation, Alcohols.
Identifiers: Hydroxymethyl octalones.

The use of photochemical fragmentation to probe the structure of excited states of ketones has been demonstrated with 10-hydroxymethyl- (Delta-1,9)-2- (2,3,4,4a,5,6,7,8-octahydro-4a-hydroxymethyl naphthalene-2-one), which reveals further the nature of the reactive excited state (s) of cyclohexenone derivatives. (Author)
AD-666 641 Not available from CFSTI.

KINETICS STUDIES ON HEMOPROTEINS BY FLASH PHOTOLYSIS.
Rome Univ (Italy) Istituto Di Chimica Biologica
For primary bibliographic entry see Field 6A.
AD-666 691 HC$3.00 MF$0.65

NANOSECOND LASER PHOTOLYSIS AND SPECTROSCOPY: EXCITED SINGLET ABSORPTION IN 1,2-BENZANTHRACENE,
TRW Systems Redondo Beach Calif Quantum Physics Lab
For primary bibliographic entry see Field 7D.
AD-666 715 Not available from CFSTI.

THE PHOTOCHEMISTRY OF SOME QUINONE METHIDES,
New York Univ N Y Dept of Chemistry
Ira S. Krull, and David I. Schuster. 1968, 68p
AROD-4019:15
Grant DA-ARO (D)-31-124-G901
Availability: Published in Tetrahedron Letters, n2 p135-9 1968.

Descriptors: (*Quinones, *Photochemistry), Spiro compounds, Ketones, Photolysis, Dienes.
Identifiers: Quinone methides.

The photolytic reactions of two substituted quinone methiodides were examined in an effort to determine the intermediacy of such compounds in the transformations of certain spirodienones.
AD-666 861 Not available from CFSTI.

RADIATION CHEMISTRY OF PROPANE,
Aerospace Research Labs Wright-Patterson AFB Ohio
L. I. Bone, L. W. Sieck, and J. H. Futrell. Jan 68, 17p Rept no. ARL-68-0006
Availability: Published in The Chemistry of Ionization and Excitation, p223-35 1967.

Descriptors: (*Propanes, *Radiation chemistry), Ionization, Radiation chemistry, Mass spectroscopy, Xenon, Krypton, Disproportionation.

Ionic fragmentation patterns were deduced for xenon- and krypton-sensitized radiolysis and for the direct radiolysis of propane. Ion titration techniques were used to measure and characterize unreactive ions in these systems, and a neutralization scheme is advanced for these ions. Decomposition schemes for excited neutral propane molecules were deduced from related experiments and incorporated into a formulation of a complete mechanism for the radiolytic decomposition of propane. It is suggested that the conversion dependence observed in earlier studies of the gas-phase radiolysis of alkanes is related to ion interception rather than to free-radical scavenging. (Author)
AD-666 888 Not available from CFSTI.

RESEARCH IN PHOTOBIOLOGY AND PHOTOCHEMISTRY.
Florida State Univ Tallahassee Dept of Biological Science
For primary bibliographic entry see Field 6A.
AD-666 912 HC$3.00 MF$0.65

SPIN RESONANCE IN IRRADIATED PLASTICS.
Lockheed Missiles and Space Co Palo Alto Calif Lockheed Palo Alto Research Lab
For primary bibliographic entry see Field 11I.
AD-667 156 HC$3.00 MF$0.65

ACTIVATION ANALYSIS: COCKCROFT-WALTON GENERATOR, NUCLEAR REACTOR, LINAC, JULY 1966-JUNE 1967,
National Bureau of Standards, Washington, D. C. Activation Analysis Section.
James R. DeVoe. Nov 67, 104p
Also available from Superintendent of Documents, GPO, Washington, D. C. 20402 $0.55 as C13.46.428.

Descriptors: (*Radioactivation analysis, Reviews), Cockroft-Walton accelerators, Silicon, Vanadium, Platinum, Neutron activation, Semiconductors, Radiochemistry, Radiological dosage, Linear accelerators, Nuclear reactors, Oxygen, Gamma rays, Beryllium, Copper, Gold, Platium, Lead, Magnesium.

Contents: Liaison activities and general facilities; Activation analysis with 14 MeV neutrons; (Instrumentation, High precision 14 MeV neutron activation analysis, Effect of sample size and gamma-ray energy on the attenuation factors); Activation analysis with reactor neutrons; (Analysis of standard reference materials, Analysis for impurities in pure reagents, Analysis of impurities in semiconductor silicon and germanium, Service analyses, Miscellaneous); Activation analysis with the electron linear accelerator (LINAC); (Facilities, Preliminary evaluations for elemental analyses).
NBS-TN-428 HC$0.55 MF$0.65

DEVELOPMENT OF A RADIOMETRIC METHOD FOR THE AUTOMATIC ANALYSIS OF PHOSPHATES AND SULPHATES IN AQUEOUS SOLUTION FINAL REPORT.
Mise Au Point D'une Methode Radiometrique D'automatisation des Analyses de Phosphates Et de Sulfates en Solution Aqueuse. Rapport Final
Societa Ricerche Impianti Nucleari, Saluggia (Italy).
A. Bruna, P. G. Caldera, and P. L. Tarditi. Feb 68, 40p EUR-3738.F, R-466
Contract EURATOM-034-65-4 IRAI
Coll- 40 P Refs Lang- in Italian, English Summary

Descriptors: *Chemical analysis, *Isotopic labeling, *Phosphates, *Solutions, *Sulfates, Phosphorus 32, Radioactive isotopes, Radiochemistry, Strontium 89, Water.

For abstract, see STAR 06 09.
N68-18492 HC$3.00 MF$0.65

SOME CONSIDERATIONS ON THE INFRARED ABSORPTION SPECTRUM OF PU O2 POWDERS AND SINTERED PELLETS.
European Atomic Energy Community, Karlsruhe (West Germany). Joint Nuclear Research Center.
For primary bibliographic entry see Field 18J.
For abstract, see STAR 06 09.
N68-18498 HC$3.00 MF$0.65

RAPID SPECTROPHOTOMETRIC DETERMINATION OF PLUTONIUM.
Forsvarets Forskningsanstalt, Stockholm (Sweden).
L.-H. Andersson, and E.-B. Bauren. Dec 67, 4p Dec. 1967 P 1-4 Refs

Descriptors: *Nitric acid, *Plutonium, *Reduction (chemistry), *Spectrometers, Color, Impurities, Ions, Oxides, Trace elements.

For abstract, see STAR 06 09.
N68-18950 HC$3.00 MF$0.65

HEATS OF FORMATION OF GASEOUS URANIUM FLUORIDES.
Chaleurs de Formation des Fluorures D'uranium Gazeuz
Commissariat A L Energie Atomique, Saclay (France).
I. N. Godnev, and A. S. Suerdlin. 1966, 9p CEA-TR-R-1905
Tran- Transl. Into French From Izv. Vyssh. Ucheb. Zaved., Khim. I Khim. Tekhnol. (Moscow), V. 9, 1966 P 40-43 Lang- in French

Descriptors: *Heat of formation, *Uranium fluorides, Gas dissociation, Gaseous diffusion, Thermal dissociation.

For abstract, see STAR 06 09.
N68-19036 HC$3.00 MF$0.65

RADIATION-INDUCED REDUCTION OF DIVALENT COPPER SALTS IN SOLUTIONS. FOIL AND CORD.
Polish Academy of Sciences, Warsaw. Inst. of Nuclear Research.

For primary bibliographic entry see Field 11I.
For abstract, see STAR 06 09.
N68-19272 HC$3.00 MF$0.65

PHOTOCHEMICAL AND REDOX PROCESSES ON CADMIUM SULFIDE ELECTRODES.
Technische Hochschule Munchen (West Germany).
For primary bibliographic entry see Field 7D.
For abstract, see STAR 06 09.
N68-19393 HC$3.00 MF$0.65

RADIATION-INDUCED REDUCTION OF DIVALENT COPPER SALTS IN SOLUTIONS.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
S. J. Marsik, and W. H. Philipp. Mar 68, 17p
NASA-TN-D-4451
Contract 129-03-15-02-22

Descriptors: *Concentration (composition), *Copper compounds, *Irradiation, *Reduction (chemistry), Electron beams, Formaldehyde, Glycerols, Methyl alcohols, Organic compounds, Salts, Solutions.

For abstract, see STAR 06 09.
N68-19434 HC$3.00 MF$0.65

8. EARTH SCIENCES AND OCEANOGRAPHY

8A. Biological Oceanography

PROCEEDINGS OF THE ONR-NSIA SYMPOSIUM ON AUTOMATIC COLLECTION, PROCESSING AND ANALYSIS OF OCEANOGRAPHIC DATA, UNIVERSITY OF CALIFORNIA, SAN DIEGO, 11-12 DECEMBER 1964.
Lockheed-California Co Burbank
10 Dec 65, 68p

Descriptors: (*Oceanographic data, Symposia), (*Data processing systems, Oceanographic data), Digital computers, Data storage systems, Bathythermograph data, Data transmission systems, Telemeter systems, Ocean currents, Sea water, Physical properties, Chemical properties, Instrumentation, Digital recording systems, Marine biology, Buoys, Surface temperatures.

The purpose of the symposium was to determine what work was being carried out by marine scientists and engineers in automatic data handling which would have direct application to the Navy's operational problems in handling oceanographic data for fleet use. Papers presented at the symposium were intended to cover the following questions: (1) What methods are in use or under development or seriously contemplated for recording data directly in a form suitable for a pre-written program on a computer ashore. (2) What methods are in use or under development or seriously contemplated for automatic processing and readout or display aboard ship for tactical purposes. (3) What guidance can researches in oceanography (recently completed or underway) using large amounts of automatic computation, give use as to the forms in which reduced data should be analyzed, stored, summarized, and disseminated. (Author)
AD-666 836 HC$3.00 MF$0.65

QUANTITATIVE DISTRIBUTION OF BOTTOM FAUNA IN NORTHWESTERN PART OF THE BERING SEA,
Naval Oceanographic Office Washington D C
G. M. Belyaev. 1968, 27p Rept no. NOO-Trans-337
Trans. of Akademiya Nauk SSSR. Institut Okeanologii. Trudy, v34 p85-103 1960, tr. by M. Slessers.

Descriptors: (*Marine biology, Bering Sea), Ocean bottom sampling, Distribution, Fishes, Invertebrates, Nutrition, Deep water, Shallow water, Tables, USSR.
Identifiers: Translations.

The paper discusses the general pattern of quantitative distribution of benthic fauna in the NW part of the Bering Sea and the basic laws to which the distribution is subjected. There are a number of Soviet papers dealing with the taxonomic groups of benthic fauna in the NW part of the Bering Sea (Makarov, 1941; Baranova, 1957; Levenshteyn, 1958, etc.) as well as with the qualitative and quantitative characterization of benthic fauna of the various areas of the sea (Deryugin and Ivanov, 1937; Makarov, 1937; Vinogradova, 1954; Sokolova, 1954, 1959; Atlas of Charts of Oceanographic data..., 1955). Therefore, the qualitative characterization of the fauna and its groups is not discussed here; only the problems dealing with the quantitative distribution of bottom fauna as whole is treated in this paper. (Author)
AD-666 985 HC$3.00 MF$0.65

ECOLOGY OF MOLLUSCS AND THE CULTURE OF MYA ARENARIA,
General Dynamics Corp Groton Conn Electric Boat Div
Edward A. Zuraw, Donald E. Leone, and Clement A. Griscom. 11 Dec 67, 123p Rept no. U413-67-206
Contract N00014-66-C-0302

Descriptors: (*Marine biology, Mollusca), (*Mollusca, Ecology), Growth, Sea water, Plankton, Hydrographic surveying, Sedimentation, Sand, Mud, Distribution, Ocean currents, Salinity, Larvae, Periodic variations, Reproduction (Physiology), Algae.

Exploratory investigations were conducted on ecological factors governing distribution of molluscs in a salt pond. Analytical treatment of wind and current data indicated that although wind-driven circulation is of sufficient magnitude to distribute mollusc larvae throughout the pond, mollusc distribution is favored in upwind regions. A mollusc census confirmed that molluscs do occur in greater abundance in upwind regions. During the census, significantly larger numbers of molluscs were found in sand sediments as compared to mud sediments. Straight-hinge larvae were observed from May through October, at three widely scattered stations on the pond system studied. No apparent difference was found in the mean number of larvae at the three stations during the monitoring period. Exploratory investigations were also conducted to determine the feasibility of culturing the soft shell clam, Mya arenaria in artificial sea water. Various techniques were investigated to induce maturation and spawning with little success. (Author)
AD-666 987 HC$3.00 MF$0.65

PROPERTIES OF BACTERIA ISOLATED FROM DEEP-SEA SEDIMENTS,
Georgetown Univ Washington D C Dept of Biology
For primary bibliographic entry see Field 6M.
AD-667 064 Not available from CFSTI.

INTERNATIONAL LEGAL PROBLEMS OF SCIENTIFIC RESEARCH IN THE OCEANS,
Ohio State Univ., Columbus. Coll. of Engineering.
For primary bibliographic entry see Field 5D.
PB-177 724 HC$3.00 MF$0.65

THE POTENTIAL OF OBSERVATION OF THE OCEANS FROM SPACECRAFT.
General Electric Co., Philadelphia, Pa. Missile and Space Div.
For primary bibliographic entry see Field 8J.
PB-177 726 HC$3.00 MF$0.65

8B. Cartography

A METHOD OF OBJECTIVE CONTOUR CONSTRUCTION,
Rand Corp Santa Monica Calif
F. W. Murray. Feb 68, 32p Rept no. RM-5564-NRL
Contract N00014-67-C-0101

Descriptors: (*Geophysics, *Mapping), (*Data processing systems, Mapping), Programming (Computers), Meteorology, Clouds, Graphics, Plotters, Cathode ray tube screens, Flow charting.
Identifiers: Computer simulation, Computer aided graphics, *Contour mapping.

Problems of graphical display of a dependent variable as a function of two independent variables are discussed. A procedure for objective construction of contours is described, and the program logic is presented. Examples of contours of fields developed by a cumulus dynamics program and produced by a General Dynamics S-C4060 are shown. (Author)
AD-666 830 HC$3.00 MF$0.65

REPORT OF NRL PROGRESS.
Naval Research Lab., Washington, D. C.
Mar 68, 52p
Available on subscription at $15.00/yr., $18.00/yr. foreign.

Descriptors: (*Naval research, Scientific research), Atmosphere, Astrophysics, Chemistry, Mathematics, Mechanics, Metallurgy, Nuclear engineering, Spectroscopy, Optics, Radar, Radio equipment, Sound, Microscopes, Oceanology.

The document is a brief outline of NRL reports.
PB-177 727 HC$3.00 MF$0.65

8C. Dynamic Oceanography

HYDROGRAPHIC STUDIES IN THE NORTHEAST GULF OF MEXICO.
Technical rept.,
Gulf South Research Inst New Iberia La Environmental Sciences and Engineering Labs
Kirby L. Drennan. Jan 68, 121p Rept no. Ref-68-0-1
Contract N00014-67-C-0514
Prepared in cooperation with Texas A and M Univ., Contract Nonr-3198 (01).

Descriptors: (*Ocean currents, Mexico Gulf), Continental shelves, Physical properties, Wind, Tides, Distribution, Periodic variations, Density, Sampling, Measurement, Salinity, Temperature, Rivers, Hydrographic surveying, Maps.

The major circulatory features and distribution of physical properties in the northeast Gulf of Mexico are presented from a series of eight quasi-synoptic surveys. Seasonal changes in hydrography and circulation over the continental shelf are shown and discussed in terms of their relationship to the offshore currents, river discharge, winds, and tides. Surface current speed and direction are determined from an extensive drift bottle study and distribution of density. (Author)
AD-666 629 HC$3.00 MF$0.65

EROSIONAL CHANNEL WALL IN LA JOLLA SEA-FAN VALLEY SEEN FROM BATHYSCAPH TRIESTE II.
Navy Electronics Lab San Diego Calif
David G. Moore. 27 Jul 64, 9p
Availability: Published in Geological Society of America Bulletin, v76 p385-92 Mar 1965.

Descriptors: (*Ocean bottom, Erosion), Sedimentation, Underwater vehicles, Clay, Ocean currents, Deposits, Silt, Echo ranging, California, Pacific Ocean.
Identifiers: Bathyscaps.

Nearly horizontal beds of stiff cohesive clays alternating with cohesionless silts crop out along a steep wall of the channel in La Jolla Fan Valley in water depths of about 3000 feet. These exposures are believed to be the result of lateral channel erosion by turbidity currents; this should result in periodic development of new channel routes. Once current erosion forms these steep walls of outcropping sediment layers, the sliding of clay blocks, local slumping, and the actions of benthic organisms modify them. Recently active turbidity currents are believed to be of a much smaller scale than those responsible for the development of the large morphological features of the over-all fan valley. (Author)
AD-666 847 Not available from CFSTI.

INTERNATIONAL LEGAL PROBLEMS OF SCIENTIFIC RESEARCH IN THE OCEANS,
Ohio State Univ., Columbus. Coll. of Engineering.
For primary bibliographic entry see Field 5D.
PB-177 724 HC$3.00 MF$0.65

THE POTENTIAL OF OBSERVATION OF THE OCEANS FROM SPACECRAFT.
General Electric Co., Philadelphia, Pa. Missile and Space Div.
For primary bibliographic entry see Field 8J.
PB-177 726 HC$3.00 MF$0.65

8D. Geochemistry

EQUILIBRIA AND NONEQUILIBRIA IN ORGANIC GEOCHEMISTRY.
Technical rept.,
Woods Hole Oceanographic Institution Mass
Max Blumer. Mar 68, 8p Rept no. WHOI-Ref-68-16
Contract Nonr-2196 (00), Grant NSF-GP-3250
Availability: Published in Advances in Chemistry Series, n67 p312-8 1967.

Descriptors: (*Geochemistry, Organic compounds), Sedimentation, Chemical reactions, Stability, Minerals, Thermal properties, Petroleum, Environment, Thermodynamics, Irreversible processes, Chemical equilibrium, Reviews.

Carbon compounds may have existed at or near thermodynamic equilibrium on the early, prebiological earth. The activity of organisms has converted most carbon in the earth's crust into thermodynamically unstable but long-lived compounds. During diagenesis a gradual, irreversible approach towards equilibrium occurs, but complete equilibrium between all components is not reached within time spans approaching the age of the earth. This does not preclude the participation of many metastable fossil organic compounds in reversible equilibria. Further study of these may lead to a tool for investigating chemical environments in the past. (Author)
AD-666 949 Not available from CFSTI.

THERMODYNAMICS OF POLYMORPHIC TRANSFORMATIONS IN SILICA. THERMAL PROPERTIES FROM 5 TO 1070K AND PRESSURE-TEMPERATURE STABILITY FIELDS FOR COESITE AND STISHOVITE.
Chicago Univ Ill Dept of Chemistry
For primary bibliographic entry see Field 8G.
AD-667 030 Not available from CFSTI.

8E. Geodesy

LEAST SQUARES ADJUSTMENT OF SATELLITE OBSERVATIONS FOR SIMULTANEOUS DIRECTIONS OR RANGES. PART 1 - FORMULATION OF EQUATIONS.
Ohio State Univ. Research Foundation, Columbus.
E. J. Krakiwsky, and A. J. Pope. Sep 67, 95p NASA-CR-93425, REPT.-86, PT. 1
Contract NSR-36-008-033

Descriptors: *Least squares method, *Rangefinding, *Satellite observation, *Tracking stations, Azimuth, Bearing (direction), Geodetic coordinates, Position (location), Satellite tracking, Tracking (position), Triangulation.

For abstract, see STAR 06 09.
N68-18763 HC$3.00 MF$0.65

ANALYSIS OF GEODETIC SATELLITE TRACKING DATA TO DETERMINE TESSERAL HARMONICS OF THE EARTH'S GRAVITATIONAL FIELD FINAL REPORT.
California Univ., Los Angeles. Inst. of Geophysics and Planetary Physics.
W. M. Kaula. 1967, 23p NASA-CR-93688
Contract NSR-05-007-060
Seri- Its Publ. No. 656

Descriptors: *Geodetic satellites, *Gravitational fields, *Photographic tracking, *Tesseral harmonics, Correlation coefficients, Geomagnetism, Geophysics, Harmonic analysis, Satellite perturbation.

For abstract, see STAR 06 09.
N68-19349 HC$3.00 MF$0.65

DATA ANALYSIS IN CONNECTION WITH THE NATIONAL GEODETIC SATELLITE PROGRAM (2) SEMIANNUAL STATUS REPORT, AUG. 1967 - JAN. 1968.
Ohio State Univ. Research Foundation, Columbus. Dept. of Geodetic Science.
Feb 68, 9p NASA-CR-93696, SASR-1
Contract NGR-36-008-093

Descriptors: *Computer programs, *Data processing, *Data reduction, *Geodetic satellites, Geometry, Satellite observation, Visual observation.

For abstract, see STAR 06 09.
N68-19452 HC$3.00 MF$0.65

8F. Geography

THE CLIMATE OF THE RUPUNUNI SAVANNAS.
Mcgill Univ Montreal (Quebec) Dept of Geography
For primary bibliographic entry see Field 4B.
AD-666 616 HC$3.00 MF$0.65

A SOCIO-DEMOGRAPHIC ANALYSIS OF ST IGNATIUS-KUMU, RUPUNUNI DISTRICT.
Technical rept. on Savanna Project,
Mcgill Univ Montreal (Quebec) Dept of Geography
David A. M. Lee. Mar 68, 42p Rept nos. TR-11, Savanna Research Series-10
Contract Nonr-3855 (00)
See also Technical Report no 13, AD-666 616.

Descriptors: (*Sociology, South America), Agriculture, Diet, Anthropology, Population, Education, Culture, Ecology, Climatology, Housing, Statistical data, Food, Tables.
Identifiers: Savannas, Demography.

A detailed understanding of Amerindian agriculture is impossible without an intensive and accurate study of demography and social life. The author has examined these two factors in the village of St. Ignatius-Kumu, where considerable economic and social change has resulted from the proximity of the village to Letheml the administrative centre of the area. The author has described the village inhabitants and their houses, their contact with nearby Brazil, which has resulted in a multilingual society, and their education. The occupations of the villagers are then examined, particularly farming, livestock, hunting and fishing, so that an idea of diet can be gained. In conclusion the advantages of a weekly market in Lethem, and the introduction of new plants are stressed. Because much agriculture occurs so far from the villages, resiting some is advocated, so that those like St. Ignatius do not become either temporary villages or labour compounds. (Author)
AD-666 617 HC$3.00 MF$0.65

BIBLIOGRAPHY ON THE CLIMATE OF BRITISH EAST AFRICA (KENYA, TANGANYIKA, UGANDA, AND ZANZIBAR).
Weather Bureau Washington D C
For primary bibliographic entry see Field 4B.
AD-666 893 HC$3.00 MF$0.65

ARCTIC BIBLIOGRAPHY.
Weather Bureau Washington D C
For primary bibliographic entry see Field 4B.
AD-666 894 HC$3.00 MF$0.65

BIBLIOGRAPHY ON THE CLIMATE OF INDOCHINA,
Weather Bureau Washington D C
For primary bibliographic entry see Field 4B.
AD-666 895 HC$3.00 MF$0.65

VEGETATION ANALYSIS WITH RADAR IMAGERY.
Kansas Univ., Lawrence. Engineering Science Div.
For primary bibliographic entry see Field 2F.
For abstract, see STAR 06 09.
N68-19214 HC$3.00 MF$0.65

REPORT OF NRL PROGRESS.
Naval Research Lab., Washington, D. C.
For primary bibliographic entry see Field 8B.
PB-177 727 HC$3.00 MF$0.65

8G. Geology and Mineralogy

BIBLIOGRAPHY OF AFCRL PUBLICATIONS FROM 1 JULY 1966 TO 30 SEPTEMBER 1967.
Air Force Cambridge Research Labs L G Hanscom Field Mass
For primary bibliographic entry see Field 5B.
AD-666 664 HC$3.00 MF$0.65

DEPTH DISTRIBUTION AND BATHYMETRIC CLASSIFICATION OF SOME SEA-FLOOR PROFILES. SUBMARINE GEOLOGY NORTH OF NEW GUINEA. EAST AND WEST AZORES FRACTURE-ZONES IN THE NORTH ATLANTIC.
Technical repts.,
Rhode Island Univ Kingston Narragansett Marine Lab
Dale C. Krause. Mar 68, 59p Rept nos. TR-13-15, Ref-67-11
Contract Nonr-396 (08)
Availability: Published in Various journals.

Descriptors: (*Oceanology, New Guinea), (*Faults (Geology), Atlantic Ocean), Ocean bottom sampling, Bathythermograph data, Echo ranging, Volcanoes, Marine geology, Depth finding, Oceanographic vessels, Magnetic fields, Anomalies, Azores, Maps, Ocean bottom topography, Classification.
Identifiers: North Atlantic Ocean.

Contents: Depth distribution and bathymetric classification of some sea-floor profiles; Submarine geology north of New Guinea; East and west Azores fracture-zones in the North Atlantic. (Author)
AD-666 704 Not available from CFSTI.

CONTINENTAL MARGIN OF WESTERN EUROPE: SLOPE PROGRADATION AND EROSION,
Scripps Institution of Oceanography La Jolla Calif
J. R. Curray, D. G. Moore, R. H. Belderson, and A. H. Stride. 19 Jul 66, 2p
Prepared in cooperation with National Inst. of Oceanography, Wormley (England).
Availability: Published in Science, v154 n3746 p265-6 Oct 14 1966.

Descriptors: (*Continental shelves, Erosion), Deposits, Structural geology, Reflection, Sedimentation, Faults (Geology), Stratigraphy, Echo ranging, Sedimentary rock, Western Europe.

Reflection profiling of the continental margin off western Europe shows seaward-dipping continental-slope deposits that have been dissected by submarine canyons west of the English Channel. These records refute previous interpretation of structural benches of older, nearly horizontal strata outcropping on the slope face. (Author)
AD-666 843 Not available from CFSTI.

GEOPHYSICAL EVIDENCE ON THE ORIGIN OF THE FAEROE BANK CHANNEL-I. CONTINUOUS REFLECTION PROFILES,
Scripps Institution of Oceanography La Jolla Calif
A. H. Stride, R. H. Belderson, J. R. Curray, and D. G. Moore. 6 Oct 66, 7p
Research supported in part by NONR and NSF. Prepared in cooperation with National Inst. of Oceanography, England and Naval Electronics Lab., San Diego, Calif.
Availability: Published in Deep-Sea Research, v14 p1-6 1967.

Descriptors: (*Ocean bottom topography, *Norwegian Sea), Sedimentation, Igneous rock, Reflection, Basalt, Ocean bottom, Seismic waves, Refraction, Measurement, Ocean currents, Volcanoes, Erosion, Hydrophones, Deep water, Thickness.
Identifiers: Faeroe Islands.

Geophysical evidence shows that the Faeroe Bank Channel separates two shoals of igneous origin and that the channel had been partly filled in by deposition of sediments on the north side. These data do not support an hypothesis of erosional origin by the strong bottom currents. (Author)
AD-666 848 Not available from CFSTI.

ARCTIC BIBLIOGRAPHY.
Weather Bureau Washington D C
For primary bibliographic entry see Field 4B.
AD-666 894 HC$3.00 MF$0.65

THERMODYNAMICS OF POLYMORPHIC TRANSFORMATIONS IN SILICA. THERMAL PROPERTIES FROM 5 TO 1070K AND PRESSURE-TEMPERATURE STABILITY FIELDS FOR COESITE AND STISHOVITE.
Revised ed.,
Chicago Univ Ill Dept of Chemistry
J. L. Holm, O. J. Kleppa, and Edgar F. Westrum, Jr. 13 Jun 67, 22p
AROD-5107:9
Grant DA-ARO (D)-31-124-G961
Presented in part at the Calorimetry Conference in Boulder, Colorado, June 1966. Revision of report dated 2 May 67.
Availability: Published in Geochimica et Cosmochimica Acta, v31 p2289-307 1967.

Descriptors: (*Minerals, Calorimetry), (*Silicon dioxide, Phase studies), Thermodynamics, Specific heat, Cryogenics, Entropy, Free energy, Enthalpy.
Identifiers: Coesite, Stishovite, Specific heat.

Cryogenic heat-capacity measurements on coesite and stishovite provide thermodynamic properties from 5 to 350K. The heat capacities (Cp), entropies (S), and Gibbs energy functions (- (G - H)/T) are 10.85, 9.65, 4.124, and 10.27, 6.64, 2.362 at 298.15K for coesite and stishovite, respectively, in cal/ (mole deg K). Enthalpies of transition for phase changes were determined by solution calorimetry in a lead-cadmium-borate solvent at 697C. The data obtained permit the delineation of P-T field phase boundaries for the stable equilibria coesite-quartz and coesite-stishovite, as well as for the metastable quartz-stishovite boundary, which are in reasonable agreement with the results of recent equilibrium and formation studies.
AD-667 030 Not available from CFSTI.

STRUCTURE OF THE EARTH'S CRUST IN THE ARCTIC.
Technical translation,
Aeronautical Chart and Information Center St Louis Mo Linguistic Section
R. M. Demenitskaya. Feb 68, 15p
ACIC-TC-1283
Trans. of International Geological Congress (no. 22), New Delhi, 1964. Report, Moscow, 1964 p114-21, tr. by George Synenko. Report on Problem 16, Geology of the Ocean and Sea Bottoms.

Descriptors: (*Structural geology, Arctic regions), Seismic waves, Echo ranging, Thickness, Ocean bottom topography, Sedimentary rock, Magnetic fields, Anomalies, Deposits, Sedimentation, Bathythermograph data, Maps, USSR.
Identifiers: Translations, Crust (Earth).

This translation is a study of the crustal structure in the Arctic, based on seismic, aeromagnetic and bathymetric observations in recent years. Seismic evidence indicates an extensive development of a two layered structure of sedimentary complex and an abrupt change of the thickness of deposits in the Arctic basin. This suggests recent intensive tectonic movements. A new map of submarine ridge axis is presented, showing the position of a new ridge and other possible rises of the Arctic Ocean floor. A map of crustal thickness in the Arctic is presented. The earth's crust in the Arctic is predominantly oceanic and intermediate and is characterized by considerable change of thickness. Great variation in crustal thickness and that of a sedimentary complex, irregular bottom topography, recently discovered and supposed rises on the ocean floor, different physical fields -- all this suggests a distinctive block structure of the earth's crust in the Arctic. (Author)
AD-667 078 HC$3.00 MF$0.65

A PHYSICAL MODEL FOR TEKTITES OF METEORITIC ORIGIN. 1 - ANALYSIS OF DATA AND PHENOMENOLOGICAL BASIS.
National Aeronautics and Space Administration. Goddard Inst. for Space Studies, New York.
J. L. Remo, and A. J. Skalafuris. Oct 67, 37p
NASA-TM-X-60922
Spon- Sponsored in Part By Aec

Descriptors: *Impact loads, *Meteoritic microstructures, *Shock heating, *Tektites, Earth surface, Geophysics, Mathematical models, Meteorite craters, Theoretical physics.

For abstract, see STAR 06 09.
N68-19138 HC$3.00 MF$0.65

COMPOSITION OF THE LUNAR HIGHLANDS - POSSIBLE IMPLICATIONS FOR EVOLUTION OF THE EARTH'S CRUST.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
P. D. Lowman, Jr.. Mar 68, 31p NASA-TM-X-63141, X-644-68-87

Descriptors: *Continents, *Earth mantle, *Lunar composition, *Lunar evolution, *Selenography, Bibliographies, Lunar soil, Lunar topography, Oceans, Rocks.

For abstract, see STAR 06 09.
N68-19437 HC$3.00 MF$0.65

LAW FOR THE SEA'S MINERAL RESOURCES,
National Council on Marine Resources and Engineering Development, Washington, D. C.
For primary bibliographic entry see Field 5D.
PB-177 725 HC$3.00 MF$0.65

8H. Hydrology and Limnology

THE SHORES OF MEGALOPOLIS: COASTAL OCCUPANCE AND HUMAN ADJUSTMENT TO FLOOD HAZARD.
Final rept.,
Thornthwaite (C. W.) Associates, Elmer, N. J. Lab. of Climatology.
Ian Burton, Robert W. Kates, John R. Mather, and Rodman E. Snead. 30 Jul 65, 225p
Contract Nonr-4043 (00)

Descriptors: (*Floods, Seacoast), (*Urban areas, Floods), Storms, Urban planning, Hazards, Damage, Beaches, Safety, Law, Statistical analysis.
Identifiers: New England.

This is a study of the human use of the outer coastal areas as related to storm hazard. Fifteen study sites were chosen along the east coast of the United States from Maine to South Carolina for intensive investigation. These studies have provided information on the geographic extent, magnitude, and rates of increase of human occupance of the outer coastal areas, the distribution and characteristics of coastal activity and settlement found within zones of varying hazard, the process of coastal settlement, development, and growth, and the relationship between varying topographic characteristics and coastal hazard. The report includes a study of coastal storm hazards, the variation in storm frequency and intensity with time, and an estimate of relative storm hazard by 25-mile segments along the east coast. Study of human adjustments to coastal flooding of Federal, state, local, and individual levels reveals the present state of our understanding about the responses to storm hazards and suggests possible future adjustments. The report concludes with brief suggestions for regulation of the type of coastal occupance by certain broad hazard zones in an effort to limit the creation of future areas of high damage potential. (Author)
AD-467 011 HC$3.00 MF$0.65

ORGANIZATION OF TOPICS AND LITERATURE REFERENCES IN THE EARTH SCIENCES FOR MACHINE STORAGE AND RETRIEVAL.
Northwestern Univ Evanston Ill Dept of Geology
For primary bibliographic entry see Field 5B.
AD-666 817 HC$3.00 MF$0.65

DIFFUSION AND SETTLING OF SEDIMENTS AT RIVER MOUTHS: A COMPUTER SIMULATION MODEL.
Technical rept.,
Stanford Univ Calif
G. F. Bonham-Carter, and Alex J. Sutherland. Mar 68, 14p Rept no. TR-1
Contract N00014-67-A-0112-0004
Availability: Published in Transactions of the Gulf Coast Association of Geological Societies, v17 p326-38 1967.

Descriptors: (*Rivers, Sedimentation), (*Deltas, Simulation), Computer programs, Particle size, Distribution, Mathematical models, Diffusion, Porosity, Deposits, Maps.
Identifiers: Computer simulation.

A FORTRAN IV computer program has been written for simulating the diffusion and settling of suspended sediment at river mouths. The rate of sediment accumulation at any point in front of the channel mouth is governed by water and sediment discharge, sediment grain size distribution, sediment density, the porosity of the resulting sediment, width and depth of the river channel and the geometry of the basin. A plane jet model is used for determining the velocity field and the rates of

sediment diffusion. By adjusting the input parameters, a variety of 'delta' deposits may be created. The shape and foreset slope of the delta fan is found to be closely controlled by grain size and discharge. By allowing the model to respond dynamically to the build up of sediment at the channel mouth, a distributary mouth bar and submerged levees can be formed. Delta simulation experiments are monitored by printing maps showing the rates of sedimentation for each grain size at every cell in a digital accounting grid, and by facies maps using alphabetic symbols. Maps and stratigraphic cross sections are drawn with a digital plotter. (Author)
AD-666 968 Not available from CFSTI.

A SIMPLE LYSIMETER FOR MEASURING THE LATENT HEAT TRANSFER FROM A VEGETATIVE COVER.
Missouri Univ., Columbia. Dept. of Soils.
For primary bibliographic entry see Field 2C.
PB-177 739 HC$3.00 MF$0.65

8I. Mining Engineering

THE USE OF HIGH MODULUS INCLUSION FOR IN-SITU STRESS DETERMINATION IN VISCOELASTIC ROCKS,
Minnesota Univ Minneapolis School of Mineral and Metallurgical Engineering
Naamen Peleg. Mar 68, 129p Rept no. TR-2-68
Contract DA-25-006-eng-14764

Descriptors: (*Rock (Geology), Stresses), Viscoelasticity, Defects (Materials), Hydrostatic pressure, Modulus of elasticity, Deformation, Compressive properties, Strain gages, Mathematical analysis, Rock salt, Metamorphic rock, Theses, Underground structures, Response, Measurement.
Identifiers: Rock mechanics, *High modulus inclusion, Crust (Earth), Inclusion meters.

Experiments have been conducted to determine the possible use of a high modulus inclusion for the direct determination of stresses in a visco-elastic material. A system was designed to sustain a constant hydrostatic pressure over a long period of time--the main feature of this system is a pressure intensifier activated and regulated by gas pressure. Two sets of tests were conducted with an inclusion inserted in a hole drilled in a salt core subjected to radial hydrostatic pressure. In the first set the inclusion was cemented into the rock and pressures ranging from 1000 to 8000 psi were applied on the specimen. Stress in the inclusion was immediately recorded and no significant time dependent change in stress was observed. The final stress recorded in the inclusion was in the order of 1.45-1.52 of the hydrostatic pressure independent of pressure level. In the second set of tests the inclusion was inserted loosely into the hole. Once contact of the creeping salt and the inclusion was created, time dependent stress change was observed in the inclusion. (Author)
AD-666 799 HC$3.00 MF$0.65

PROJECTION OF APPLICATIONS AND NATIONAL BENEFITS OF A NEW RAPID EXCAVATION TECHNOLOGY.
Technical rept.,
Operations Research, Inc., Silver Spring, Md.
Armando Lago, Paul D. Williams, Harold Nisselson, and Harvey D. Kushner. 8 Sep 67, 187p
TR-446
Contract DI-14-09-0070-399

Descriptors: (*Mining engineering, Advanced planning), (*Underground structures, Feasibility studies), Management planning, earth-handling equipment, Construction, Railroads, Roads, Water supplies, Electric power production, Communication systems, Power supplies, Fuels, Cost effectiveness, Costs, Systems engineering, Wastes (Sanitary engineering), Urban areas, Nuclear industrial applications, Federal budgets.
Identifiers: Rapid excavation techniques, Tunneling, Subsurface excavations, Rapid transit systems.

An 8-week study was sponsored by the U. S. Bureau of Mines to meet the need to provide a basis for interagency planning and program coordination on rapid excavation technology. Specific results required of the study were: Projections of requirements for excavation, by time period, over the years 1968-1990; Estimates of the benefits expected to accrue from rapid excavation technology developments to meet those requirements. The specific applications of rapid excavation technology considered are limited to those underground excavation projects (e.g., tunneling) which do not disturb the overlying surface except at the excavation portal or for permanent access to the completed underground facility. (Author)
PB-177 784 HC$3.00 MF$0.65

8J. Physical Oceanography

HYDROGRAPHIC STUDIES IN THE NORTHEAST GULF OF MEXICO.
Gulf South Research Inst New Iberia La Environmental Sciences and Engineering Labs
For primary bibliographic entry see Field 8C.
AD-666 629 HC$3.00 MF$0.65

DEPTH DISTRIBUTION AND BATHYMETRIC CLASSIFICATION OF SOME SEA-FLOOR PROFILES. SUBMARINE GEOLOGY NORTH OF NEW GUINEA. EAST AND WEST AZORES FRACTURE-ZONES IN THE NORTH ATLANTIC.
Rhode Island Univ Kingston Narragansett Marine Lab
For primary bibliographic entry see Field 8G.
AD-666 704 Not available from CFSTI.

PROCEEDINGS OF THE ONR-NSIA SYMPOSIUM ON AUTOMATIC COLLECTION, PROCESSING AND ANALYSIS OF OCEANOGRAPHIC DATA, UNIVERSITY OF CALIFORNIA, SAN DIEGO, 11-12 DECEMBER 1964.
Lockheed-California Co Burbank
For primary bibliographic entry see Field 8A.
AD-666 836 HC$3.00 MF$0.65

CONTINENTAL MARGIN OF WESTERN EUROPE: SLOPE PROGRADATION AND EROSION,
Scripps Institution of Oceanography La Jolla Calif
For primary bibliographic entry see Field 8G.
AD-666 843 Not available from CFSTI.

GEOPHYSICAL EVIDENCE ON THE ORIGIN OF THE FAEROE BANK CHANNEL-I. CONTINUOUS REFLECTION PROFILES,
Scripps Institution of Oceanography La Jolla Calif
For primary bibliographic entry see Field 8G.
AD-666 848 Not available from CFSTI.

CALCULATION OF ICE VOLUME AND HUMMOCKS. USING BAFFIN SEA AS EXAMPLE,
Naval Oceanographic Office Washington D C
For primary bibliographic entry see Field 8L.
AD-666 884 HC$3.00 MF$0.65

BASIC FEATURES OF TECTONIC STRUCTURE OF THE BOTTOM OF THE MEDITERRANEAN SEA.
Technical translation,
Aeronautical Chart and Information Center St Louis Mo Linguistic Section
E. M. Emelyanov. Jan 68, 30p
ACIC-TC-1284
Trans. of International Geological Congress (no. 22), New Delhi, 1964, Report, Moscow, 1964 p97-113, tr. by George Synenko. Report on Problem 16, Geology of the Ocean and Sea Bottoms.

Descriptors: (*Ocean bottom topography, Mediterranean Sea), Seismic waves, Bathythermograph data, Echo ranging, Deep water, Sedimentation, Earthquakes, Thickness, Stratigraphy, Volcanoes, USSR.
Identifiers: Translations, Crust (Earth).

New tectonic and bathymetric charts of the Mediterranean Sea, some results of seismic investigations, tectonic charts of Europe and Eurasia, data on volcanism, earthquakes and gravimetry are used in this paper. The different geological history is clearly expressed in the bottom topography of the Western and Eastern basins of the Mediterranean Sea. Accumulative plains occupy large areas in the Algiers-Provence and Tyrrhenian basins. Abyssal areas and two systems of deep-sea depressions are found. The thickness of the sediments vary between the eastern and western part of the Mediterranean Sea. There is no granitic layer in the deep sea parts of certain sections. The Mediterranean Sea is considered as a basin of transition type of the earth's crust. Side by side with the stabilized areas there are also some areas of uncompleted Alpine cycle with signs of transformation of the continental crust into the oceanic type. (Author)
AD-667 077 HC$3.00 MF$0.65

STRUCTURE OF THE EARTH'S CRUST IN THE ARCTIC.
Aeronautical Chart and Information Center St Louis Mo Linguistic Section
For primary bibliographic entry see Field 8G.
AD-667 078 HC$3.00 MF$0.65

ANALYSIS OF APOLLO AS-501 MISSION EARTH PHOTOGRAPHY.
National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.
For primary bibliographic entry see Field 14E.
For abstract, see STAR 06 09.
N68-19451 HC$3.00 MF$0.65

INTERNATIONAL LEGAL PROBLEMS OF SCIENTIFIC RESEARCH IN THE OCEANS,
Ohio State Univ., Columbus. Coll. of Engineering.
For primary bibliographic entry see Field 5D.
PB-177 724 HC$3.00 MF$0.65

THE POTENTIAL OF OBSERVATION OF THE OCEANS FROM SPACECRAFT.
General Electric Co., Philadelphia, Pa. Missile and Space Div.
Dec 67, 179p
Prepared in cooperation with the National Council on Marine Resources and Engineering Development, Washington, D. C.

Descriptors: (*Oceanology, *Space surveillance systems), Sensors, Infrared equipment, Radiometers, Scattering, Radar, Spectrometers, Effectiveness, Costs, Scientific satellites, Fishes, Minerals, Petroleum, Transportation, Infrared photography, Models (Simulations), Economics, Weather forecasting.

Contents: Space oceanographic achievements; User requirements; Space ocean technology; Evaluation; Space oceanographic systems; Economic contributions of space oceanography; and, Space oceanographic prognosis.
PB-177 726 HC$3.00 MF$0.65

8K. Seismology

A STUDY OF TWO SHORT-PERIOD DISCRIMINANTS.
Technical note,
Massachusetts Inst of Tech Lexington Lincoln Lab
Edward J. Kelly. 12 Feb 68, 60p Rept no. 1N-1968-8
ESD-TR-68-16
Contract AF 19 (628)-5167, ARPA Order-512

Descriptors: (*Seismological stations, Montana), (*Underground explosions, Detection), Earthquakes, Nuclear explosions, Seismic waves, Detection, Intensity, Epicenter, Sensors, Phased arrays, Signal-to-noise ratio, Energy, Power spectra.
Identifiers: Large aperture seismic arrays, LASA, Seismic noise, Graphs (Charts).

The paper is the result of a large-population study of discrimination between earthquakes and explosions, using only short-period data from a single station. The data was obtained from the Large Aperture Seismic Array and the two discriminants studied were waveform complexity and spectral ratio. Procedures for multivariate discrimination are developed and results are given in terms of earthquake identification percentages using these discriminants singly, and in combination with each other and with magnitude. The results are quite encouraging, complete separation being found for explosions and shallow earthquakes using spectral ratio and magnitude together. (Author)
AD-666 701 HC$3.00 MF$0.65

PORTABLE FIELD RECORDING SYSTEM.
AC Electronics-Defense Research Labs Santa Barbara Calif Sea Operations Dept
For primary bibliographic entry see Field 14C.
AD-666 828 HC$3.00 MF$0.65

FOREIGN SCIENCE BULLETIN, VOL. 4, NO. 3, 1968.
Library of Congress Washington D C Aerospace Technology Div
For primary bibliographic entry see Field 20G.
AD-666 875 HC$3.00 MF$0.65

BASIC FEATURES OF TECTONIC STRUCTURE OF THE BOTTOM OF THE MEDITERRANEAN SEA.
Aeronautical Chart and Information Center St Louis Mo Linguistic Section
For primary bibliographic entry see Field 8J.
AD-667 077 HC$3.00 MF$0.65

8L. Snow, Ice, and Permafrost

COMPARISON OF PERMAFROST CONDITIONS IN CANADA AND THE USSR.
Technical paper,
National Research Council of Canada Ottawa (Ontario) Div of Building Research
R. J. E. Brown. Aug 67, 20p Rept no. TP-255 NRC-9741
Availability: Published in Polar Record, v13 n87 p741-51 Sep 1967.

Descriptors: (*Permafrost, Arctic regions), Temperature, Climatology, Terrain, Canada, USSR, Siberia.

Canada and the USSR together possess most of the territory in the Northern Hemisphere underlain by permafrost or perennially frozen ground. As about one half of the land area of each country is affected, the permafrost region of the Soviet Union is 2 1/2 times larger than that of Canada. Outside mountainous regions, permafrost extends southward in Canada to the southern tip of James Bay at lat 51 degrees N (Brown, in press). Permafrost extends farther south in eastern Asia, however, and occurs in Outer Mongolia and Manchuria to about lat 47 degrees N (Baranov, 1959; Nekrasov, 1962). The distribution of permafrost varies from discontinuous in the south to continuous in the north. In the discontinuous zone, permafrost exists in combination with some areas and layers of unfrozen ground. In the southern fringe of this discontinuous zone, permafrost occurs in scattered islands from a few square metres to several hectares in size. Northward it becomes widespread with isolated patches of unfrozen ground. Permafrost varies in thickness from a few centimetres at the southern limit to several hundred metres at the boundary of the continuous zone--about 60 to 100 m in Canada and 250 to 300 m in Siberia. Unfrozen layers, or taliks, may occur between layers of permafrost. The depth to the permafrost table is extremely variable, ranging from about 0.5 to 3 m. The active layer, which freezes in winter and thaws in summer, does not always extend to the permafrost table. (Author)
AD-666 842 Not available from CFSTI.

CALCULATION OF ICE VOLUME AND HUMMOCKS. USING BAFFIN SEA AS EXAMPLE.
Naval Oceanographic Office Washington D C
V. P. Khrol. 1967, 36p Rept no. NOO-Trans-357
Trans. of Gosudarstvennyi Okeanograficheskii Institut. Trudy (USSR) v86 p44-74 1965, tr. by M. Slessers.

Descriptors: (*Sea ice, Volume), Sea water, Thickness, Mathematical analysis, Distribution, Atmospheric temperature, Bays, Arctic regions, Atlantic Ocean, USSR.
Identifiers: Baffin Bay.

The paper discusses the essentials of a method used for the calculation of ice volume in a sea by which the hummockness of ice is accounted for so that the actual data on hummockness are not needed. The method is exemplified by the calculation of ice for the Baffin Sea. (Author)
AD-666 884 HC$3.00 MF$0.65

ARCTIC BIBLIOGRAPHY.
Weather Bureau Washington D C
For primary bibliographic entry see Field 4B.
AD-666 894 HC$3.00 MF$0.65

AN EMPIRICAL DETERMINATION OF THE RELATIVE DIELECTRIC CONSTANT OF THE GREENLAND ICE CAP,
Army Electronics Command Fort Monmouth N J Inst for Exploratory Research
D. C. Pearce, and J. W. Walker. 1967, 5p
Availability: Published in Journal of Geophysical Research, v72 n22 p5743-7 Nov 15 1967.

Descriptors: (*Ice, Greenland), Dielectric properties, Thickness, Radar reflections, Depth finding, Mathematical models, Electromagnetic waves, Measurement, Airborne, Mathematical analysis.

Recent measurements of 30-Mhz radar pulse propagation times and density in the ice cap at Camp Century, Greenland, have been used to obtain an empirical relation between ice density and relative dielectric constant. The resulting dependence between density and dielectric constant, which is in agreement with the dielectric theory of Polder and Van Santen, yields a relative dielectric constant of deep ice of 3.31 plus or minus 0.04, corresponding to a density of 9.920 g/cu cm.
AD-667 106 Not available from CFSTI.

SUB-SOIL DRAINAGE AND THE STRUCTURAL DESIGN OF ROADS,
Road Research Lab., Crowthorne (England).
K. Russam. 1967, 15p RRL-LR110

Descriptors: (*Roads, Drainage), Soil mechanics, Moisture, Permeability, Strength, Performance (Engineering), Great Britain, Pavements, Design, Water, Construction, Permeability.
Identifiers: Sub-soil drainage, Water table.

The purpose of longitudinal drains under roads and their effectiveness in lowering the water table are discussed. The effect of lowering the water table on the strength of road subgrades, and hence on the design thickness of flexible pavements, is examined. Shallow longitudinal drains are used to drain the road structure and also to remove surface water. Deeper drains in permeable soils can be used to lower the water-table and thus to increase the strength of the sub-grade. However in saturated soils of low permeability, such as heavy clays, deep drains are ineffective in lowering the water-table below formation level and do not significantly increase the strength of the soil. (Author)
PB-177 715 HC$3.00 MF$0.65

8M. Soil Mechanics

CURRENT MEASUREMENTS FROM MOORED BUOYS.
Technical rept.,
Woods Hole Oceanographic Institution Mass
N. P. Fofonoff. Mar 68, 12p Rept no. WH01-Ref-68-12
Contract N00014-66-C-0241
Availability: Published in Buoy Technology, Trans. Int. Buoy Techn. Symp. (2nd), Washington, D. C., Sep 18-20 1967, p409-18.

Descriptors: (*Ocean currents, Measurement), (*Mooring buoys, Life expectancy), Velocity, Depth indicators, Surface properties, Cables (Mechanical), Degradation, Floats, Distribution, Recovery, Instrumentation.

Since January 1965, a program has been underway at the Woods Hole Oceanographic Institution, to measure currents at a limited number of fixed sites on a year round basis. Initially, one site was instrumented with both surface and subsurface moorings. The program has now been expanded to 4 major sites, extending along 70 degrees W, from 39 degrees 20 min. N to the Hatteras Abyssal Plain at 30 degrees N. In nearly three years of operation, a total of 65 moorings have been placed at the working sites, for periods up to six months. Recoveries from these sites have provided many velocity records of excellent quality. The repetitive exposure of moorings of essentially similar design under relatively standardized conditions has served to define clearly the design and operational problems that are inherent in such a program. A brief account is given of some of the problems encountered in routine buoy setting operations, and some of the results obtained from the measurements. (Author)
AD-666 633 Not available from CFSTI.

DEVELOPMENT OF A FREE-FIELD SOIL STRESS GAGE FOR STATIC AND DYNAMIC MEASUREMENTS.
Final rept.,
Army Engineer Waterways Experiment Station Vicksburg Miss
J. K. Ingram. Feb 68, 108p Rept no. AEWES-TR-1-814

Descriptors: (*Soils, Strain gages), Stresses, Measurement, Performance (Engineering), Sensitivity, Pressure, Calibration, Design, Response, Thermal stresses, Captive tests, Hysteresis, Sand, Clay, Test equipment.
Identifiers: Small blast load generators.

The report describes the development of three free-field stress gage types. One gage design, the sand dollar gage, was abandoned early in the investigation, while the other two, the W and SE gages, were subjected to various evaluation tests. Static and dynamic tests in sand and clay were conducted in the Small Blast Load Generator (SBLG). The gages have been used in the laboratory evaluation of a cold gas loader and in two field tests. Evaluation of the performance of the gages in these tests is presented in Appendix A. The gage placement techniques used in the SBLG tests are described in Appendix B. The gages are rugged and relatively easy to place in the laboratory. They may be used for both static and dynamic measurements and have a linear pressure range from 1 to above 1,800 psi. The gages have very low acceleration sensitivity and hysteresis, and have excellent dynamic response capability. Their temperature sensitivity is such that it will be of little consequence in dynamic tests and can be corrected for in long-term static tests. Electrical sensitivity remains essentially constant from -30 to 150F. Of the two

gage types discussed, the SE gage is recommended for use. It is much easier to place, is more rugged, and produces a cleaner dynamic signal than the W gage. The gages can be calibrated to compensate for registration errors due to differences in soil and gage modulus; however, gage registration was found to be a function of placement method, depth of burial, input pressure, and conditions of the medium, not simply of modulus ratio. (Author)
AD-666 769 HC$3.00 MF$0.65

SURFICIAL SEDIMENTS ON UNDULATING CARY GROUND MORAINE IN CENTRAL IOWA.
Technical rept.,
Iowa State Univ Ames Soil Research Lab
R. B. Daniels, and R. L. Handy. 1968, 23p Rept nos. TR-3, Contrib-66-14
Contract Nonr-4868 (01)

Descriptors: (*Soils, Iowa), Erosion, Sedimentation, Deposits, Thickness, Carbonates, Terrain, Clay, Quartz, Feldspar, X-ray diffraction analysis, Classification, Paleontology, Minerals.
Identifiers: Moraines (Glacialogy).

A post-glacial surficial sediment 0.3 to 3.6 m or more thick overlies the Cary till in central Iowa, and is usually separated from the till by a discontinuous, often weakly-expressed stone line. In the areas studied, the surficial sediments cover more than 90 per cent of the present landscape and form a major soil parent material. Although deposition of the surficials has caused a reduction in topographic relief on the Cary ground moraine, thickness of the surficials is not predictable from the present topography due to burial of channels and alluvial drowning of highs. The surficials were found to be mineralogically similar to the underlying till, but more homogeneous, indicative of mixing. X-ray data suggest that clay minerals in the surficials are slightly more weathered than those in the underlying till. Carbonate contents are variable due to leaching, secondary enrichment and the local abundance of aquatic and pulmonate fossils. The surficial sediment gradually becomes finer textured from the crest of a swell to the bottom of a swale. (Author)
AD-666 977 HC$3.00 MF$0.65

CBE FACTORS: MONTHLY SURVEY NO. 22.
Library of Congress Washington D C Aerospace Technology Div
For primary bibliographic entry see Field 15B.
AD-666 991 HC$3.00 MF$0.65

CLIFTON-HIGHLINE CANAL EXPERIMENTAL PROJECT 1 70-1 (14)33,
Interim rept.,
Colorado State Dept. of Highways. Planning and Research Div.
Bud A. Brakey. Jan 68, 21p
Prepared in cooperation with Bureau of Public Roads, Washington, D. C. See also PB-173 758.

Descriptors: (*Roads, Stability), (*Clay, Soil mechanics), Pavements, Test methods, Physical properties, Experimental design, Deflection, Asphalt, Membranes, Moisture, Performance (Engineering), Colorado.
Identifiers: Clay swelling.

In the spring of 1965 construction was completed on a section of I-25 north of Grand Junction. Mancos clay formations exist quite generally in this area and greatly affect highway pavement performance. Thirty-three test sections were laid out on this project using different types of subgrade treatments. Pavement performance tests have been made quarterly by the Research Unit with soil tests being made by the District and Central Laboratory personnel. Average PSI values ranged from near 4.0 in 1965 to 3.25 in the fall of 1967. Some sections having thick open-graded, granular subbases show a PSI lower than 2.9. The decrease in the PSI has not been attributed to distress in the base or subbase. At this time, the loss in PSI appears to come from a swelling in the subgrade and a small amount of raveling on the surface. (BPR abstract)
PB-177 698 HC$3.00 MF$0.65

A LABORATORY INVESTIGATION OF THE PHYSICAL AND CHEMICAL PROPERTIES OF BURNT COLLIERY SHALE,
Road Research Lab., Crowthorne (England).
C. K. Fraser, and J. R. Lake. 1967, 22p RRL-LR125

Descriptors: (*Shale, *Soil mechanics), (*Slags, Civil engineering), Construction, Construction materials, Standards, Cements, Road tests, Frost heave, Great Britain.

The report describes an investigation of the physical and chemical properties of burnt colliery shale from a large deposit near the proposed route of the new Trunk Road A.8 in West Lothian. Large samples were taken from the surface of this deposit, the selection of the shale being made on a colour and texture basis. The samples were subjected to standard tests to determine their suitability for use in road construction. (Author)
PB-177 710 HC$3.00 MF$0.65

EARTHWORKS IN SOFT CHALK: A STUDY OF SOME OF THE FACTORS AFFECTING CONSTRUCTION,
Road Research Lab., Crowthorne (England).
A. W. Parsons. 1967, 35p RRL-LR112

Descriptors: (*Sedimentary rock, *Soil mechanics), Construction, Stability, Tests, Construction materials, Road tests, Failure (Mechanics), Great Britain, Earth-handling equipment.
Identifiers: *Chalk.

The report describes an investigation into the problems associated with the construction of earthworks in soft chalk. During the construction of chalk earthworks on two major road projects, measurements were made of the state of compaction achieved in the compacted fill and of the dry density and moisture content of the natural chalk, and observations were made to determine possible causes of instability in the compacted fill. (Author)
PB-177 711 HC$3.00 MF$0.65

STUDIES OF THE KEUPER MARL PHYSICAL PROPERTIES,
Road Research Lab., Crowthorne (England).
A. D. Marsh. 1967, 24p RRL-LR116

Descriptors: (*Clay, *Soil mechanics), Physical properties, Soils, Test methods, Statistical data, Adsorption, Clay minerals, Moisture, Great Britain.
Identifiers: Keuper Marl.

The report describes measurements of the surface area, reflection spectra and suction properties of Keuper Marl. The correlation of this physical properties with the mineralogical analysis, chemical analysis and classification tests of the soils is discussed.
PB-177 714 HC$3.00 MF$0.65

CLIMATOLOGICAL STUDIES.
Final rept.,
Iowa State Univ. of Science and Technology, Ames. Dept. of Agronomy.
Robert H. Shaw. 15 May 67, 70p
Contract Cwb-11160

Descriptors: (*Soil mechanics, Climatology), (*Moisture, Soil mechanics), Agriculture, Atmospheric precipitation, Drainage, Evaporation, Dehydration, Heat transfer, Evapotranspiration, Stresses, Meteorological parameters, Periodic variations, Statistical analysis, Solar radiation, Plants (Botany), Agriculture, Water supplies, Mathematical prediction.
Identifiers: Evaporimeters.

The report summarizes the developments made on the prediction of soil moisture, pointing out the apparent solutions which have been made and problems which still must be considered. The different components of the prediction technique are briefly discussed. Figures from earlier reports are reproduced in some cases to add clarity to the results and discussion.
PB-177 745 HC$3.00 MF$0.65

8N. Terrestrial Magnetism

VAN NORMAN LAKE MAGNETOMETER FACILITY,
Aerospace Corp El Segundo Calif Lab Operations
Wallace B. Harbridge, and Donald A. McPherson.
Jan 68, 21p Rept no. TR-0158 (9220-02)-5
SAMSO-TR-68-96
Contract F04695-67-C-0158

Descriptors: (*Astronomical observatories, *Magnetometers), Sensors, Magnetic fields, Design, Instrumentation, Calibration, Wiring diagrams, Sensitivity, Recording systems, California, Operation.

The report discusses the design and operation of a triaxial magnetometer facility developed for the Aerospace Corporation solar observatory at Van Norman Lake, California. Magnetometer sensors and associated electronics measure three components of the geomagnetic field. Fluctuations of the field (plus or minus 100 gamma) are recorded on a continuous basis at a recorder sensitivity of 2 gamma/mm. (Author)
AD-666 660 HC$3.00 MF$0.65

RESEARCH DIRECTED TOWARD THE COLLECTION, REDUCTION AND EVALUATION OF GEOMAGNETIC FIELD DATA.
Final rept. 1 Nov 64-31 Oct 67,
Boston Coll Chestnut Hill Mass
John F. Devane, and John E. Hogan. 5 Jan 68, 48p
AFCRL-68-0014
Contract AF 19 (628)-4793

Descriptors: (*Terrestrial magnetism, Data), Measurement, Telluric currents, Rockets, Magnetosphere, Airborne, Magnetometers, Solar wind, Instrumentation.
Identifiers: Micropulsations, International Years of the Quiet Sun.

The operation of the Weston Geomagnetic Observatory is described. Brief descriptions are given of the Weston Index of magnetic activity, and of projects on the quiet day variation, telluric current and micropulsation recording. The support of the Air Force program of geomagnetic field measurement by rockets is described. This includes a detailed description of the process whereby taped data from rocket flights is processed. Results of theoretical investigations of geomagnetic field phenomena are cited through resulting publications. (Author)
AD-666 935 HC$3.00 MF$0.65

RAPID GEOMAGNETISM FIELD VARIATIONS OBSERVED AT CONJUGATE LOCATIONS,
Earth Sciences Labs Boulder Colo
W. H. Campbell. 1968, 19p
Availability: To be published in Radio Science, 41p Jul 68.

Descriptors: (*Magnetic storms, Periodic variations), Ionospheric disturbances, Polarization, Extremely low frequency, Magnetohydrodynamics, Aurorae, Propagation, Magnetic fields, Ionosphere, Distribution, Attenuation, Magnetosphere, Polar regions, Northern Hemisphere, Southern Hemisphere.
Identifiers: Micropulsations.

Group 8N—Terrestrial magnetism

In the frequency range of 4.0 to 0.002 Hz natural rapid variations of the magnetic field of the earth have been reported to occur at pairs of near-geomagnetically conjugate locations in the Northern and Southern Hemispheres. This paper is a review of the present knowledge of such phenomena. At conjugate auroral and sub-auroral latitude stations, the pulsations of irregular amplitude variation (pi) which are associated with particle precipitation, are, at times, simultaneous and of identical form, but on occasions quite dissimilar activity occurs. The pulsations with a smooth, more sinusoidal form (pc) are generally quite similar at conjugate locations. Polarization determinations of the pc's have been mostly recently investigated to determine the propagation characteristics of hydromagnetic waves in the magnetosphere. Similar rapid magnetic field variations at low latitude and equatorial stations are often found at many widely spaced stations not necessarily conjugate. (Author)
AD-666 945 Not available from CFSTI.

STRUCTURE OF THE EARTH'S CRUST IN THE ARCTIC.
Aeronautical Chart and Information Center St Louis Mo Linguistic Section
For primary bibliographic entry see Field 8G.
AD-667 078 HC$3.00 MF$0.65

THE IDENTIFICATION OF MOVING MAGNETIC FIELD LINES.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
T. J. Birmingham, and F. C. Jones. Feb 68, 16p
NASA-TM-X-63123, X-641-68-68

Descriptors: *Electric conductors, *Identifying, *Magnetic fields, Atmospheric models, Earth atmosphere, Ionospheric drift, Magnetosphere, Particle diffusion, Time dependence.

For abstract, see STAR 06 09.
N68-19274 HC$3.00 MF$0.65

OGO-2 MAGNETIC FIELD OBSERVATIONS DURING THE MAGNETIC STORM OF MARCH 13-15, 1966.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
J. C. Cain, and R. A. Langel. Oct 67, 43p NASA-TM-X-63142, X-612-68-88
Conf- Presented At the Iaga Spec. Events Symp., St. Gall, Switzerland, 2 Oct. 1967 Subm- Submitted for Publication

Descriptors: *Geomagnetism, *Ionospheric storms, *Magnetic flux, *Magnetic storms, *Ogo-b, *Vanguard 3 satellite, Auroras, Bibliographies, Correlation, Magnetic disturbances, Magnetic fields, Magnetic measurement, Magnetosphere.

For abstract, see STAR 06 09.
N68-19435 HC$3.00 MF$0.65

9. ELECTRONICS AND ELECTRICAL ENGINEERING

9A. Components

HIGH POWER VARACTOR FOR UHF TRANSMISSION.
Quarterly progress rept. no. 1, 1 Jul-30 Sep 64.
Motorola Inc., Phoenix, Ariz.
30 Sep 64, 25p
Contract DA-28-043-AMC-00278 (E)

Descriptors: (*Varactor diodes, Silicon), Ultrahigh frequency, Epitaxial growth, Tests, Effectiveness, Manufacturing methods, Thermal stresses, Test equipment (Electronics).

Double diffused devices have been improved from a previous level of 21 watts output at about 55% efficiency to 24 watts output at 60% efficiency. This has been accomplished by using increased silicon die diameter from .030 inch to .040 inch. Consideration was given to the use of a planar, epitaxial device in a cartridge type package with the objective of further improving thermal characteristics and reducing package parasitics. Devices were fabricated employing a junction diameter of approximately .030 inch which delivered 25 watts output at 64% efficiency. (Author)
AD-456 484 HC$3.00

GRIDDED AMPLIFIER TUBES FOR PULSED C-BAND FREQUENCIES.
Machlett Labs., Inc., Springdale, Conn.
For primary bibliographic entry see Field 9E.
AD-485 173 HC$3.00 MF$0.65

GRIDDED AMPLIFIER TUBES FOR PULSED C-BAND FREQUENCIES.
Quarterly progress rept. no. 3, 15 Mar-14 Jun 66,
Machlett Labs., Inc., Springdale, Conn.
W. Brunhart, and A. J. Pineau. 30 Sep 66, 25p
EP-715-3
ECOM-01665-3
Contract DA-28-043-AMC-01665 (E)

Descriptors: (*Triodes, *Microwave amplifiers), C band, Cathodes (Electron tubes), Circuits, Broadband, Electrodes, Anodes (Electron tubes), Electric insulation, Aluminum compounds, Oxides, Beryllium compounds, Reliability (Electronics), Life expectancy.

Tubes of type EE-44 and EE-50 were assembled to evaluate the static characteristics and the progress of the grid development and to study the effects of very close interelectrode spacings. The coaxial output section of the EE-50 was evaluated over the required bandwidth. Additional analysis corroborated the need for a revised coaxial tube input section. The new design is discussed, as are the results of swept frequency evaluations of the EE-50. Author)
AD-488 565 HC$3.00 MF$0.65

COMPLEMENTARY INSULATED GATE FIELD EFFECT TRANSISTOR CIRCUITS.
Air Force Inst of Tech Wright-Patterson AFB Ohio School of Engineering
For primary bibliographic entry see Field 9E.
AD-666 645 HC$3.00 MF$0.65

CONTRIBUTION TO THE KNOWLEDGE OF MAGNETIC BALANCE AND SUSPENSION SYSTEMS.
Massachusetts Inst of Tech Cambridge Aerophysics Lab
For primary bibliographic entry see Field 14B.
AD-666 668 HC$3.00 MF$0.65

MULTISECTION WAVEGUIDE DIRECTIONAL FILTER.
Research and development technical rept.,
Army Electronics Command Fort Monmouth N J
William P. Dattilo. Dec 67, 42p Rept no. ECOM-2910

Descriptors: (*Waveguide filters, Multiplex), Design, Waveguide slots, Waveguide irises, Waveguide couplers, Attenuation, Cavity resonators, Performance (Engineering), Microwave equipment, Band-pass filters, Low-pass filters.

A five-section waveguide directional filter was fabricated and evaluated with regard to its practical use as a multiplexing filter. The use of multi-section filters is desirable in a practical multiplexing system due to the need for increased selectivity to isolate adjacent channels. In addition, a relatively broadband coupling technique has been investigated which permits the realization of bandwidths that are greater than a fraction of 1%, which up to now have been typical for these devices. A 1.3% bandwidth has been achieved using a two-slot iris geometry for the end couplings. The various problem areas associated with fabricating and testing the device are discussed and certain recommendations are made which should eliminate their causes and result in a further improved filter. (Author)
AD-666 759 HC$3.00 MF$0.65

RADIATION CHARACTERISTIC OF APERTURE-LIMITED DOMINANT BEAM MODE OF LENS-TYPE BEAM WAVEGUIDE.
Technical rept.,
Army Electronics Command Fort Monmouth N J
F. Schwering. Jan 68, 35p Rept no. ECOM-2920

Descriptors: (*Waveguides, Beams (Electromagnetic)), Electromagnetic lenses, Lens antennas, Antenna apertures, Antenna radiation patterns, Wave transmission.
Identifiers: Modes (Electrical), Far field.

The radiation characteristic of the dominant beam mode of a lens-type beam waveguide is discussed; the assumption is made that this mode illuminates a circular aperture in a metallic screen. Radiation patterns are presented for various aperture radii and various distances between the aperture plane and the last lens of the guide. The exact field distribution of the beam mode can be determined without extensive computations only at the location of the lenses, and this only for confocal guides. In all other cases, the Gaussian approximation of the mode function was used for calculation of the radiation characteristics. In the special case where the exact field distribution is known, the characteristics derived from this distribution have been compared with those obtained using the corresponding Gaussian approximation. For sufficiently large lens apertures the 3 dB beam width of the actual and the approximate patterns is nearly the same, while the side lobe level of the two patterns shows differences depending on the aperture radius. (Author)
AD-666 774 HC$3.00 MF$0.65

HIGH PERFORMANCE THIN FILMS FOR MICROCIRCUITS.
Radio Corp of America Somerville N J Defense Microelectronics
For primary bibliographic entry see Field 9E.
AD-666 776 HC$3.00 MF$0.65

WIDE-ANGLE INTERNAL DEFLECTION STRUCTURES OF CATHODE-RAY TUBES.
Triannual rept. no. 4, 1 Jul-31 Oct 67,
Army Electronics Command Fort Monmouth N J
Rudolf G. E. Hutter. Feb 68, 16p
ECOM-02449-4, PIBMRI-1355
Contract DA-28-043-AMC-02449 (E)
See also AD-661 305.

Descriptors: (*Electron lenses, Deflection), (*Electron guns, *Cathode ray tubes), Electron beams, Focusing, Design, Corrections, Distortion.

Factors that determine spot size in cathode-ray tubes are examined. The suitability of a 'modified Pierce gun' for use in cathode-ray tubes is being investigated. A method for measuring spot size and current distribution in the spot is analyzed. Electron guns for use in a multigun cathode-ray tube were designed. (Author)
AD-666 794 HC$3.00 MF$0.65

DEVELOPMENT OF LINEAR POWER TUBES.
Interim development rept. 17 Nov 67-16 Feb 68,
Eimac San Carlos Calif
Gordon E. Liljegren, and William H. Sain. Mar 68, 81p
NAVESC-TR-68-9
Contract N00024-67-C-1044

Descriptors: (*Beam power tubes, Tetrodes), Linear systems, Ultrahigh frequency, Modulation,

Distortion, Feasibility studies, Radiofrequency power.
Identifiers: Intermodulation.

An engineering model which meets the requirements of Phase II (intermodulation distortion of -45 db maximum third order and -50 db maximum fifth order with power output of 2000 to 5000 watts PEP) was delivered. A test report, which includes a proposed test specification prepared in MIL format, was also completed and submitted. The test report includes test results on two tubes of the same model. One tube was shipped and the other is available for further tests. For a given set of operating conditions, the intermodulation distortion ratio for both tubes is 50 db third and fifth order from zero to 5000 watts PEP output, with better than 50 per cent efficiency. Engineering models, using the EIMAC 4CX15000A as prototype, are being built and tested. These models are designed to meet the requirements of Phase III (5000 to 15000 watts PEP output with -40 db maximum third order intermodulation distortion). The first experimental models, which were scaled from the successful Phase II design, were compared to the EIMAC 4CX15000A and were not as good in intermodulation distortion performance as the standard tube. The EIMAC 4CX15000A, when operated with zero signal plate current of 1.25 amperes, gives an intermodulation distortion ratio of 40 db third and fifth order in the power range from zero to 15 kW PEP. Additional experimental models are being designed and built in an attempt to reduce the required zero signal plate current and improve efficiency of operation. (Author)
AD-666 962 HC$3.00 MF$0.65

FREQUENCY VARIATION OF THE MOS-TRANSISTOR VD = 0 ADMITTANCE.
Revised ed.,
Illinois Univ Urbana Materials Research Lab
R. F. Pierret. 16 Jun 67, 11p
AFOSR-68-0592
Contract SD-131, Grant AF-AFOSR-714-67
Revision of report dated 8 May 67.
Availability: Published in Solid-State Electronics, v11 p253-60 1968.

Descriptors: (*Transistors, Performance (Engineering)), Capacitance, Electrical impedance, Metals, Oxides, Silicon dioxide, Theory.
Identifiers: *Metal oxide semiconductors, Equivalent circuits, Frequency variation.

A transmission line model is used to calculate the small signal equivalent capacitance and conductance of the MOS-transistor at zero source to drain voltage. Comparison with experiments show that the major features of the equivalent capacitance are predicted by the theory for frequency greater than 10 kHz. The conductance in the inversion range is also in good agreement with theory. The frequency dependence of the conductance from omega square to the square root of momega (low to high frequencies) is also in excellent agreement with theory. (Author)
AD-667 005 Not available from CFSTI.

IMPROVED TWO-PORT MAGNETOELASTIC DELAY LINE EFFICIENCY THROUGH CONTROLLED POLARIZATION REVERSALS,
Army Electronics Command Fort Monmouth N J Electronic Components Lab
William J. Skudera, Jr. Sep 67, 1p
Availability: Published in IEEE Transactions on Magnetics, vMAG-3 n3 p414 Sep 1967.

Descriptors: (*Delay lines, Efficiency), Garnet, Yttrium compounds, Iron compounds, S band, Polarization.
Identifiers: Magnetoelastic waves.

It has been clearly pointed out by Strauss and generally understood that a 2-port magnetoelastic delay line is usually more desirable than a single port line for microwave applications. However, until recently, the 2-port line operation resulted in considerably higher insertion loss because, for a YIG rod, the magnetoelastic waves are confined to a region between the generation point and the near end face. Of the two previous methods found to lower this loss, one employs auxiliary permanent magnets and the other utilizes optical contact bonding of YAG disks. The permanent magnets were applied orthogonally to the usual axial magnetic field used to magnetize the YIG rod while the YAG quarter-wave disks were bonded to each end of a YIG rod and then an axial field applied. In this paper it is shown that efficiencies can be improved by approximately 20 dB without the use of auxiliary fields and without YAG disks. This has been accomplished primarily by slight orientation adjustments of the YIG rod with respect to the axial magnetic field. This apparently results in a complete polarization reversal such that maximum energy can be coupled through the transmission delay line. (Author)
AD-667 116 Not available from CFSTI.

INTERFEROMETRIC EFFECT WITH SEMICONDUCTORS IN THE MILLIMETER-WAVE REGION,
Army Electronics Command Fort Monmouth N J Electronic Components Lab
For primary bibliographic entry see Field 20L.
AD-667 117 Not available from CFSTI.

CERAMIC DIELECTRICS WITH RELATIVELY HIGH THERMAL CONDUCTIVITIES.
Brush Beryllium Co Elmore Ohio
For primary bibliographic entry see Field 11B.
AD-667 162 Not available from CFSTI.

GRIDDED AMPLIFIER TUBES FOR PULSED C-BAND FREQUENCIES.
Quarterly progress rept. no. 4, 15 Jun-14 Sep 66,
Machlett Labs., Inc., Springdale, Conn.
W. Brunhart, and A. Pineau. Dec 66, 25p
ECOM-01665-4
Contract DA-28-043-AMC-01665 (E)

Descriptors: (*Triodes, Manufacturing methods), C band, Microwave amplifiers, Thermal stresses, Voltage, Failure (Electronics).

First assemblies of tube type EE-53 have been fabricated. Assembly problems and their solutions are discussed. Grid fabrication remains a major factor in final tube yield. A variation, designated type EE-53-1, is discussed. Test fixtures for the first dynamic testing of the EE-53 are described. (Author)
AD-806 055 HC$3.00 MF$0.65

REED SWITCHING DEVICES.
Final rept. no. 8, 1 Apr 64-30 Mar 67,
General Reed Co., Metuchen, N. J.
Harry J. Sundermerer. Sep 67, 122p
ECOM-00059-F
Contract DA-28-043-AMC-00059 (E)

Descriptors: (*Relays, *Electric switches), Miniature electronic equipment, Packaging, Life Expectancy, Thermal properties, Statistical analysis, Specification, Data, Manufacturing methods, Design.
Identifiers: *Reed relays, Loading (Electrical).

The results of a program for the development and evaluation of a reliable, long life miniature Form C switch capsule and a family of miniature electromagnetic relays compatible with miniaturized electronic equipment circuit requirement employing the capsule are presented. The program was conducted in two phases: The design, fabrication and evaluation of the reed switch capsule followed by relay design, fabrication and evaluation. Primary emphasis during the capsule design and evaluation phase was placed on the conduct of a full factorial experiment to ascertain the functional relationships of combined operational parameters on life expectancy of miniature Form C reed switches. A total of 135 Final Development Switches were tested under five combinations of temperature, load and drive levels. The test instrument designed and built to accomplish this phase is described, and the results tabulated for subsequent statistical analysis. Design details and the results of a test program involving 150 engineering samples, including the results of a relay life test experiment conducted under various combined operational levels of temperature, load and drive conditions, are presented for analysis to establish correlation factors between capsule and relay performance.
AD-820 431 HC$3.00 MF$0.65

STUDY - HIGH DIELECTRIC CONSTANT THIN FILM CAPACITOR MATERIALS. DELIVERABLE HARDWARE PROCESS SPECIFICATIONS AND TEST DATA MATERIALS REPORT.
TRW Systems, Redondo Beach, Calif.
R. P. Radke. 26 Apr 67, 33p NASA-CR-65986
Contract NAS9-5592

Descriptors: *Capacitors, *Dielectric properties, *Materials tests, *Niobates, *Sodium compounds, *Thin films, Circuits, Electrical properties, Niobium compounds, Product development, Solid state devices.

For abstract, see STAR 06 09.
N68-18502 HC$3.00 MF$0.65

CHARACTERISTICS OF TUNNELING P-N JUNCTIONS.
National Aeronautics and Space Administration. Electronics Research Center, Cambridge, Mass.
J. B. Hopkins. Mar 68, 22p NASA-TN-D-4403
Contract 125-21-03-11

Descriptors: *Electron tunneling, *P-n junctions, *Semiconductors (materials), *Tunnel diodes, *Volt-ampere characteristics, Computation, Digital computers.

For abstract, see STAR 06 09.
N68-19062 HC$3.00 MF$0.65

SOLID STATE IMAGE SENSOR RESEARCH, PHASE 2.
General Electric Co., Syracuse, N. Y. Electronics Lab.
W. E. Davern, D. P. Dwyer, G. C. Gerhard, R. E. Glusick, and L. S. Jobin. Mar 68, 68p NASA-CR-86039
Contract NAS12-131

Descriptors: *Indium arsenides, *Infrared detectors, *Integrated circuits, *Photodiodes, Cryogenics, Electric wire, Electronic packaging, P-n junctions, Plastics, Preamplifiers, Thin films.

For abstract, see STAR 06 09.
N68-19209 HC$3.00 MF$0.65

THERMIONIC CATHODE EVALUATION STUDY INTERIM REPORT, 1 OCT. - 31 DEC. 1967.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. Raytheon Co., Waltham, Mass. Microwave and Power Tube Div.
F. H. Hill. 29 Jan 68, 35p NASA-CR-93672, PT-1735
Contracts NAS7-100, JPL-951810
Prep- Prepared for Jpl

Descriptors: *Long term effects, *Performance tests, *Service life, *Thermionic cathodes, Cell anodes, Coatings, Current density, Electric potential, Field emission, Temperature gradients.

For abstract, see STAR 06 09.
N68-19363 HC$3.00 MF$0.65

DEVELOPMENT OF HIGH-TEMPERATURE, HIGH-CURRENT, ALKALI-METAL, VAPOR-FILLED, CERAMIC THYRATRONS AND RECTIFIERS QUARTERLY PROGRESS REPORT.

Group 9A—Components

General Electric Co., Schenectady, N. Y. Tube Dept.
A. W. Coolidge. 6 Oct 65, 27p NASA-CR-54751, GES-23-467
Contract NAS3-6005

Descriptors: *Barium, *Electrodes, *High current, *Thallium, *Thyratrons, *Vapor pressure, Alkali metals, Ceramics, Cesium, Electron emission, High temperature, Rectifiers.

For abstract, see STAR 06 09.
N68-19433 HC$3.00 MF$0.65

TRANSIENT WAVES EXPANSION FOR DIFFERENTLY ARRANGED OPEN WIRE CIRCUITS FORM OF THE TRANSIENT OSCILLATION POTENTIAL IN CASE OF SHORT-LINE FAULTS.
Ausbreitung Von Wanderwellen Bei Verschiedenew Anordnungen Von Freileitungen Im Hinblick Auf Die Form Der Einschwingspannung Bei Abstandskurzschluessen
Technische Hochschule Munchen (West Germany).
H. Karrenbauer. 1967, 143p
Lang- in German

Descriptors: *Circuit protection, *Electric power transmission, *Power lines, *Short circuits, *Transmission circuits, Bibliographies, Circuit breakers, Fourier analysis, Laplace transformation, Phase control, Phase shift, Voltage regulators.

For abstract, see STAR 06 09.
N68-19469 HC$3.00 MF$0.65

9B. Computers

DISCRIMINANT FUNCTIONS: PROPERTIES, CLASSES, AND COMPUTATIONAL TECHNIQUES.
Stanford Univ., Calif. Stanford Electronics Labs.
For primary bibliographic entry see Field 12A.
AD-465 281 HC$3.00 MF$0.65

FUNDAMENTALS OF THRESHOLD LOGIC.
Scientific Interim rept.,
RCA Labs Princeton N J
Robert O. Winder. Jan 68, 122p Rept no. Scientific-1
AFCRL-68-0066
Contract F19628-68-C-0070

Descriptors: (*Computer logic, Theory), Logic circuits, Gates (Circuits), Special functions (Mathematical), Linear programming, Algorithms, Theorems.
Identifiers: *Threshold logic, Switching theory.

These notes on threshold logic are intended as intermediary material between a completely geometric, heuristic presentation and the more formal source material available in the literature. Basic definitions and simple properties of threshold function are developed, followed by a complete treatment of monotonicity theory - algorithms for positivization and ordering of arguments are given, both geometric and algebraic. Heuristic, Chow-parameter, and linear-program methods of test-synthesis are presented, along with discussions of reduction theory and partially specified functions. A geometric synthesis method for networks of 3-input majority gates is given, and the author's method of general network synthesis discussed geometrically. Two basic tables are included. Although only the more basic concepts have been treated, a complete bibliography is provided, together with suggestions for further reading. (Author)
AD-666 650 HC$3.00 MF$0.65

CONFIGURATION MANAGEMENT OF COMPUTER PROGRAM CONTRACT END ITEMS,
Elect nic Systems Div L G Hanscom Field Mass Technical Requirements and Standards Office
M. S. Piligian, C. J. Bashaw, and J. L. Pokorney. Jan 68, 23p
ESD-TR-68-107

Descriptors: (*Computer programs, *Management control systems), Management engineering, Configuration, Design, Specifications, Performance (Engineering), Identification, Control, Flow charting, Instruction manuals, Life cycle, Military requirements.

Experience at ESD in the application of AFSCM 375-1, Configuration Management During Definition and Acquisition Phases, to electronic systems/projects identified a deficiency in the area of computer programs. Attempts to apply the manual to the computer segment of a computer-based system showed that techniques to handle the computer programs portion were lacking. Techniques and procedures developed for the application of configuration management to computer programs were developed and published as ESD Exhibit EST-1 to augment the basic manual. This paper presents the concepts embodied in the exhibit and describes a program for establishing, monitoring and updating a configuration management system for computer programs acquired as part of an Air Force system. (Author)
AD-666 652 HC$3.00 MF$0.65

SOVIET CYBERNETICS: RECENT NEWS ITEMS, NO. 15,
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 6D.
AD-666 654 HC$3.00 MF$0.65

ON MAN-COMPUTER INTERACTION: A MODEL AND SOME RELATED ISSUES,
Bolt Beranek and Newman Inc Cambridge Mass
Jaime R. Carbonell. 14 Sep 67, 42p Rept nos. Scientific-1, BBN-1593
AFCRL-68-0053
Contract F19628-68-C-0125, ARPA Order-627

Descriptors: (*Computers, Man-machine systems), Behavior, Time sharing, Interactions, Costs, Decision theory, Programming (Computers), Mathematical models.
Identifiers: On-line systems, Debugging (Computers), Optimal control theory.

A survey of the literature related to man-computer interaction reveals the many aspects of this problem, which appears to be in the crossroads among such diverse fields as computer languages, computer systems operational characteristics, control theory, decision theory, information theory, applied psychology, computer display and interface engineering, etc. In this paper we have chosen to present the on-line interaction from an information and decision point of view. A model is given of the case in which a human operator is engaged on-line in the solution of a problem like debugging a program, testing a model in a scientific application, or performing a library search. In this model the human operator is considered to seek to minimize overall cost. This cost is obtained by adding the operational cost of both man and computer to a remnant terminal cost originated by the remaining uncertainty. This analysis, performed for each of a set of possible alternatives for action, may lead to select and execute one of them, to terminate the process, or to re-evaluate the possible alternatives and/or hypotheses in a search for new ones. Some practical applications in terms of response time and other characteristics of a computer utility are presented, as well as some theoretical implications from an informational point of view. (Author)
AD-666 666 HC$3.00 MF$0.65

LEARNING THROUGH PATTERN RECOGNITION APPLIED TO A CLASS OF GAMES.
Scientific interim rept.,
Case-Western Reserve Univ Cleveland Ohio Systems Research Center
Elliot B. Koffman. 13 May 67, 156p Rept no. SRC-107-A-67-45
AFOSR-68-0514
Grants AF-AFOSR-125-67, NSF-GK-185

Descriptors: (*Learning machines, Problem solving), (*Artificial intelligence, Learning machines), Pattern recognition, Game theory, Dynamic programming, Set theory, Computer programs, Theses.

The objective of this research was to investigate a technique for machine learning useful in solving problems involving forcing states. In games or control problems, a forcing state is a state from which the final goal can always be reached, regardless of what disturbances may arise. A program which learns forcing states in a class of games (in a game-indepndent format) by working backwards from a previous loss has been written. The class of positions which ultimately results in the opponent's win is learned by the program (using a specially designed description language) and stored in its memory together with the correct move to be made when this pattern reoccurs. During future plays of the game, these patterns are searched for. If they are formed by the opponent, the learning program blocks them before the opponent's win sequence can begin. If they are formed by the learning program, it initiates the win sequence. The class of games in which the program is effective includes Qubic, Go-Moku, Hex, and the Shannon Network Games including Bridg-it. The description language enables the learning program to generalize from one example of a forcing state to all other configurations which are strategically equivalent. (Author)
AD-666 673 HC$3.00 MF$0.65

ALGEBRA AUTOMATA I: PARALLEL PROGRAMMING AS A PROLEGOMENA TO THE CATEGORICAL APPROACH.
Scientific interim rept.,
Stanford Univ Calif Dept of Electrical Engineering
M. A. Arbib, and Y. Give'on. 1967, 26p
AFOSR-68-0453
Contract AF 49 (638)-1440, Grant AF-AFOSR-1198-67

Descriptors: (*Learning machines, Automata), (*Mathematical logic, Automata), Set theory, Mapping (Transformations), Graphics, Algebra, Theorems.
Identifiers: Automata theory.

Wright, Thatcher and Mezei have built on the observation of Buchi that finite automata may be considered to be monadic algebras, to study non-monadic algebras from the viewpoint of automata theory, and have generalised the usual studies of regular sets and context-free languages in this context. This report continues this work, but shifts the emphasis from the use of algebra automata as acceptors to the dynamics of algebras with outputs. It is shown that the Nerode and Myhill approaches to state minimisation and minimal dynamics can be carried through in the general case. In Part I, the interpretation of algebra automata as executing parallel programs is emphasised. However, Eilenberg and Wright have shown that much of the work can be carried through in the context of categorical algebra, using the notion of algebraic theory introduced by Lawvere as a categorical explication of the notion of variety initiated by Birkhoff. The results in Part I pave the way for the extension of this categorical framework to the treatment of algebra automata as dynamic systems in our 'Algebra Automata II.' (Author)
AD-666 677 HC$3.00 MF$0.65

PROGRAM SOLUTIONS TO SPACE SCIENCE PROBLEMS.
International Business Machines Corp Cambridge Mass Cambridge Advanced Space Systems Dept
For primary bibliographic entry see Field 22B.
AD-666 687 HC$3.00 MF$0.65

DECOMPOSITION THEORY OF SEMIAUTOMATA AND AUTOMATA.
Final rept. Jul-Dec 67,
Stanford Research Inst Menlo Park Calif
Michael Yoeli, and James Turner. 8 Dec 67, 61p
AFCRL-67-0686
Contract F19628-67-C-0295

Descriptors: (*Learning machines, Automata), (*Mathematical logic, Automata), (*Artificial intelligence, Automata), Graphics, Functions, Control systems, Theorems.
Identifiers: Sequential machines, Automata theory.

The report is divided in three parts. Part A establishes a general algebraic theory of semi-automata and automata decompositions. Homomorphic relations and their applications to transition graphs are considered. These relations extend the concept of homomorphic functions, and suitably generalize well known results on partitions having the substitution property and quotient algebras. Both completely and incompletely specified transition graphs are considered. The relationship between automata behavior and the algebraic structure of their semi-automata is considered. The final section of Part A relates cascade decompositions of automata involving two or more components to the algebraic structure of their semi-automata. Part B discusses various aspects of cascade-decomposition techniques for Mealy automata. An attempt is made to combine the engineering viewpoint of the decomposition theory of Hartmanis and Stearns with the mathematically elegant but uneconomical decomposition theory of Krohn and Rhodes. New results are obtained on the proper selection of a tail machine. Efficient techniques for the cascade decomposition of some classes of semi-automata are discussed. Further research in this direction appears very promising. Part C discusses state splitting for single input machines. A concept of a useful split is introduced. Criteria for a transformation graph to have a useful split or to have only useless splits are developed. (Author)
AD-666 689 HC$3.00 MF$0.65

REGULAR EXPRESSIONS AND CHECKING EXPERIMENTS,
Polytechnic Inst of Brooklyn N Y Microwave Research Inst
S. Erol Gelenbe. Sep 67, 54p Rept no. PIBMRI-1378-67
AFOSR-68-0218
Contract AF 49 (638)-1402

Descriptors: (*Learning machines, Automata), (*Mathematical logic, Automata), (*Artificial intelligence, Automata), Groups (Mathematics), Set theory, Simultaneous equations, Matrix algebra, Theorems, Theses.
Identifiers: Sequential machines, Automata theory.

The paper reviews the theory of regular expressions and focuses some attention on their use for the representation of the state behaviour of sequential machines. A brief review of diagnostics making use of distinguishing sequences for the design of text experiments for strongly connected machines follows. These principles are then applied to the systematic design of present checking experiments for which two design methods are proposed. Both these methods involve the solution of n-simultaneous regular equations. An upper bound to the length of the experiments is formulated. The length of the experiments designed in the fashion is seen to be of the same order of magnitude but generally somewhat longer than the length which would be obtained by the other methods on the same principles which have appeared in the literature. (Author)
AD-666 696 HC$3.00 MF$0.65

GENERAL RESEARCH.
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 5B.
AD-666 712 HC$3.00 MF$0.65

DIGITAL DEVICES FOR AUTOMATIC CONTROL: MEASUREMENT AND GUIDANCE,
Foreign Technology Div Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 13H.
AD-666 726 HC$3.00 MF$0.65

TIME SHARING. PART ONE. THE FUNDAMENTALS OF TIME SHARING. PART TWO. AN EVALUATION OF COMMERCIAL TIME SHARING COMPUTERS. PART THREE. OPERATIONAL MANAGEMENT OF TIME SHARING SYSTEMS.
Data processing monograph series,
Carnegie Inst of Tech Pittsburgh Pa
C. Gordon Bell, M. M. Gold, A. C. Steadry, Richard R. Linde, and Paul E. Chaney. 1967, 130p
Contracts Nonr-760 (24), SD-146
Research supported in part by Air Force Systems Command. Prepared in cooperation with MIT, and System Development Corporation.

Descriptors: (*Time sharing, State-of-the-art reviews), Data storage systems, Input-output devices, Programming (Computers), Remote control systems, Digital computers, Real time, Operation, Scheduling, Economics, Management planning, Correlation techniques, Multiple operation.
Identifiers: On-line systems, Batch processing, Privacy (Computers).

Contents: The fundamentals of time sharing; An evaluation of commercial time sharing computers; Operational management of time sharing systems.
AD-666 730 HC$3.00 MF$0.65

THE ADDITION OF SECONDARY SHOCK CAPABILITY AND MODIFICATIONS TO THE GASL THREE-DIMENSIONAL CHARACTERISTICS PROGRAM. PART II. USER'S AND PROGRAMMER'S MANUAL.
General Applied Science Labs Inc Westbury N Y
For primary bibliographic entry see Field 20D.
AD-666 742 HC$3.00 MF$0.65

A GENERAL FORTRAN PROGRAM FOR LEAST-SQUARES ANALYSIS OF VARIANCE,
Army Weapons Command Rock Island Ill Weapons Operations Research Office
For primary bibliographic entry see Field 12A.
AD-666 748 HC$3.00 MF$0.65

A METHOD FOR PREDICTING THE TRIM CONSTANTS AND THE ROTOR-BLADE LOADINGS AND RESPONSES OF A SINGLE-ROTOR HELICOPTER.
Cornell Aeronautical Lab Inc Buffalo N Y
For primary bibliographic entry see Field 1C.
AD-666 802 HC$3.00 MF$0.65

A SIMULATION PROGRAM FOR THE EVALUATION OF AN ASW MISSION.
Stanford Research Inst Menlo Park Calif
For primary bibliographic entry see Field 15A.
AD-666 812 HC$3.00 MF$0.65

A METHOD OF OBJECTIVE CONTOUR CONSTRUCTION,
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 8B.
AD-666 830 HC$3.00 MF$0.65

CREST: COMPUTER ROUTINE FOR EVALUATION OF SIMULATED TACTICS.
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
For primary bibliographic entry see Field 15G.
AD-666 832 HC$3.00 MF$0.65

PROCEEDINGS OF THE ONR-NSIA SYMPOSIUM ON AUTOMATIC COLLECTION, PROCESSING AND ANALYSIS OF OCEANOGRAPHIC DATA, UNIVERSITY OF CALIFORNIA, SAN DIEGO, 11-12 DECEMBER 1964.
Lockheed-California Co Burbank
For primary bibliographic entry see Field 8A.
AD-666 836 HC$3.00 MF$0.65

FOREIGN SCIENCE BULLETIN, VOL. 4, NO. 3, 1968.
Library of Congress Washington D C Aerospace Technology Div
For primary bibliographic entry see Field 20G.
AD-666 875 HC$3.00 MF$0.65

A SURVEY OF PROGRESS IN CODING THEORY IN THE SOVIET UNION.
Stanford Research Inst Menlo Park Calif
For primary bibliographic entry see Field 9D.
AD-666 917 HC$3.00 MF$0.65

THE STATISTICAL AND COMPUTATIONAL ANALYSIS OF A SIMPLE LEARNING PROGRAM.
Duke Univ Durham N C Medical Center
For primary bibliographic entry see Field 6D.
AD-666 932 HC$3.00 MF$0.65

IMAGE DENSITY GRADIENT ANALYSIS.
Final rept. 12 Jan 67-12 Dec 67,
Perkin-Elmer Corp Norwalk Conn Electro-Optical Div
John Kelly, and E. C. Yeadon. Feb 68, 56p Rept no. 9104
RADC-TR-67-658
Contract F30602-67-C-0100

Descriptors: (*Photographic intelligence, *Data processing systems), Aerial reconnaissance, Modulation, Transfer functions, Accuracy, Densitometers, Photographic intelligence, Photointerpretation, Aerial photography, Photographic images, Air Force systems command, Performance (Engineering), Statistical analysis.
Identifiers: *Edge gradient analysis.

The Image Density Gradient Analysis effort was concerned with (1) the determination of the accuracy and precision of the Perkin-Elmer Edge Gradient Analysis (EGA) technique, and (2) the modification of the EGA computer programs for use with the IBM 360 Model 30E computer. Two sets of special targets were prepared to check accuracy and precision. The first set contained edges with varying degrees of linear image motion and the second set contained an array of sinusoidal transmittance targets and a low contrast edge. The special targets were used to test the accuracy and precision of the EGA technique. The results showed that the technique was accurate and precise out to spatial frequencies of 200 cycles per millimeter. The linear motion targets were measured using the Mann Microanalyzer. The results showed that this instrument was accurate over the spatial frequency range of 0 to 100 cycles per millimeter. The EGA computer programs were modified and successfully tested on an IBM 360 Model 30E computer. (Author)
AD-666 937 HC$3.00 MF$0.65

A TAPEHANDLER FOR THE CDC 1604.
Technical rept.,
Lambda Corp Arlington Va
Joanna Frawley. Dec 67, 84p Rept no. Lambda Paper 13
Contract DCA-56

Descriptors: (*Digital computers, Magnetic tape), (*War games, Data processing systems), Errors, Handling, Magnetic recording systems, Subroutines, Programming languages, Flow charting, Computer programs, Sequences.
Identifiers: CDC 1604 Computers.

This paper describes in detail the TAPEHANDLER, which speeds tape operations and provides a check on tape reading and writing errors. The TAPEHANDLER was created primarily for use with the QUICK war gaming system, developed for the National Military Command System Support Center of the Defense Communications Agency, in support of the Joint War Games Agency. (Author)
AD-666 989 HC$3.00 MF$0.65

THE USE OF CONCEPTUAL RELATIONS IN CONTENT ANALYSIS AND DATA BASE STORAGE,
Tracor Inc Austin Tex
Roger C. Schank. Jan 68, 57p Rept no. TRACOR-68-347-U

Descriptors: (*Computers, Artificial intelligence), Linguistics, Data storage systems, English language, Analysis, Semantics, Memory, Data transmission systems, Programming languages, Cybernetics.

Machines that may be said to function intelligently must be able to understand questions posed in natural language. Since natural language may be assumed to have an underlying conceptual structure, it is desirable to have the machine structure its own experience, both linguistic and nonlinguistic, in a manner concomitant with the human method for doing so. This paper presents some attempts at organizing the machine's information store conceptually. The attempts are discussed and coordinated into a framework for what may be a practicable system. (Author)
AD-666 992 HC$3.00 MF$0.65

DEFENSE DOCUMENTATION CENTER FIVE YEAR PLAN STUDY. VOLUME I. FIVE YEAR PLAN.
System Development Corp Falls Church Va
For primary bibliographic entry see Field 5B.
AD-667 170 HC$3.00 MF$0.65

DEFENSE DOCUMENTATION CENTER FIVE YEAR PLAN STUDY. VOLUME II. NEEDS AND REQUIREMENTS.
System Development Corp Falls Church Va
For primary bibliographic entry see Field 5B.
AD-667 171 HC$3.00 MF$0.65

DEFENSE DOCUMENTATION CENTER FIVE YEAR PLAN STUDY. VOLUME III. STATE OF THE ART STUDY.
System Development Corp Falls Church Va
For primary bibliographic entry see Field 5B.
AD-667 172 HC$3.00 MF$0.65

DEFENSE DOCUMENTATION CENTER FIVE YEAR PLAN STUDY: APPENDIX.
System Development Corp Falls Church Va
For primary bibliographic entry see Field 5B.
AD-667 173 MF$0.65

SHOCK-SPECTRUM ANALYSIS PROGRAM.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
D. C. Snyder, and D. B. Wiksten. 1 Mar 67, 29p NASA-CR-93435, JPL-TM-33-326
Contract NAS7-100

Descriptors: *Computer programs, *Fortran, *Ibm 7094 computer, *Shock spectra, Accelerometers, Digital data, Dynamic response, Input, Linear filters, Magnetic tapes, Mechanical oscillators, Mechanical shock, Output, Punched cards, Signal analysis.

For abstract, see STAR 06 09.
N68-18457 HC$3.00 MF$0.65

STUDY OF SPACEBORNE MULTIPROCESSING, PHASE 2 QUARTERLY REPORT.
North American Rockwell Corp., Anaheim, Calif.
L. J. Koczela. 30 Oct 67, 98p NASA-CR-93431, C6-1476.16/33
Contract NAS12-108

Descriptors: *Computer design, *Onboard equipment, *Point to point communications, *Space communication, *Spacecraft electronic equipment, Airborne equipment, Digital integrators, Input, Operations research, Output, Systems engineering.

For abstract, see STAR 06 09.
N68-18536 HC$3.00 MF$0.65

LEAST SQUARES ADJUSTMENT OF SATELLITE OBSERVATIONS FOR SIMULTANEOUS DIRECTIONS OR RANGES. PART 3 - SUBROUTINES.
Ohio State Univ. Research Foundation, Columbus.
J. Ferrier, E. J. Krakiwsky, and J. P. Reilly. Dec 67, 54p NASA-CR-93424, REPT.-88
Contract NSR-36-008-033

Descriptors: *Least squares method, *Satellite observation, *Subroutines, Adjusting.

For abstract, see STAR 06 09.
N68-18724 HC$3.00 MF$0.65

ONBOARD CHECKOUT AND DATA MANAGEMENT SYSTEM (OCDMS) COMPUTER SELECTION CRITERIA.
Planning Research Corp., Los Angeles, Calif.
D. H. Stomberg. 25 Aug 67, 36p NASA-CR-61613, PRC-D-1180
Contract NAS8-20367
Its Tech. Advisement Memo. No. 171-5

Descriptors: *Computer design, *Equipment specifications, *Onboard equipment, Computer components, Computer programming, Computer programs, Data processing, Ibm computers, Management planning, Mission planning, Spacecraft electronic equipment.

For abstract, see STAR 06 09.
N68-18742 HC$3.00 MF$0.65

ONBOARD CHECKOUT AND DATA MANAGEMENT SYSTEM (OCDMS).
Planning Research Corp., Los Angeles, Calif.
1 May 67, 85p NASA-CR-61612, PRC-R-852
Contract NAS8-20367

Descriptors: *Airborne equipment, *Checkout, *Data systems, *Spacecraft electronic equipment, Data processing equipment, Maintenance.

For abstract, see STAR 06 09.
N68-18782 HC$3.00 MF$0.65

SUPPORT SYSTEM FOR ONBOARD CHECKOUT AND DATA MANAGEMENT SYSTEM (OCDMS), SATURN/ APOLLO APPLICATION PROGRAM.
Planning Research Corp., Los Angeles, Calif.
16 Jun 67, 91p NASA-CR-61610, PRC-D-1177
Contract NAS8-20367

Descriptors: *Airborne equipment, *Checkout, *Computer programs, *Data systems, *Spacecraft electronic equipment, Apollo applications program, Computers, Requirements, Specifications.

For abstract, see STAR 06 09.
N68-18783 HC$3.00 MF$0.65

ONBOARD CHECKOUT AND DATA MANAGEMENT SYSTEM - DESIGN SUPPLEMENTARY.
Planning Research Corp., Los Angeles, Calif.
31 Mar 67, 53p NASA-CR-61611, PRC-D-1403
Contract NAS8-20367
Seri- Its Tech. Advisement Mem. No. 171-3

Descriptors: *Checkout, *Data acquisition, *Data systems, *Data transmission, *Logic design, *Spacecraft electronic equipment, Adapters, Coding, Computers, Digital data, Display devices, Time lag, Transmission lines.

For abstract, see STAR 06 09.
N68-18831 HC$3.00 MF$0.65

SUPERVISORY SYSTEM FOR ONBOARD CHECKOUT AND DATA MANAGEMENT SYSTEM, (OCDMS), SATURN/ APOLLO APPLICATION PROGRAM.
Planning Research Corp., Los Angeles, Calif.
16 Jun 67, 91p NASA-CR-61614, PRC-D-1178
Contract NAS8-20367

Descriptors: *Apollo project, *Computer programs, *Data processing, *Spacecraft communication, Data systems, Onboard equipment, Quality control, Saturn project.

For abstract, see STAR 06 09.
N68-18945 HC$3.00 MF$0.65

THE DEVELOPMENT OF ADVANCED DIGITAL TECHNIQUES FOR DATA ACQUISITION PROCESSING AND COMMUNICATION INTERIM SCIENTIFIC REPORT.
ADCOM, Inc., Cambridge, Mass.
W. R. Bechtold, E. H. Gavenman, and J. Levy. 1 Nov 67, 66p NASA-CR-86036, G-98
Contract NAS12-554

Descriptors: *Data processing, *Digital techniques, *Imaging techniques, *Mapping, Communication theory, Computerized simulation, Correlation coefficients, Data acquisition, Error analysis, Noise reduction, Points (mathematics), Transmission lines.

For abstract, see STAR 06 09.
N68-19077 HC$3.00 MF$0.65

VOYAGER SPACECRAFT PHASE B, TASK D. VOLUME 4 - ENGINEERING TASKS. BOOK 3 - CENTRAL COMPUTER FINAL REPORT.
General Electric Co., Philadelphia, Pa. Missile and Space Div.
16 Oct 67, 53p NASA-CR-93555, DIN-67SD4379, V. 4, BK. 3
Contract NAS8-22603

Descriptors: *Central electronic management system, *Digital computers, *Systems engineering, *Voyager project, Comparison, Data processing, Evaluation, Numerical analysis, Redundancy, Spacecraft electronic equipment.

For abstract, see STAR 06 09.
N68-19092 HC$3.00 MF$0.65

PRELIMINARY DESIGN FOR A RUGGEDIZED IMAGING SYSTEM FINAL ENGINEERING REPORT, 9 JAN. - 11 AUG. 1967.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. Ryan Aeronautical Co., San Diego, Calif.
A. A. Harmon. 20 Oct 67, 87p NASA-CR-93676, REPT.-29169-9
Contracts NAS7-100, JPL-951572
Prep- Prepared for Jpl

Descriptors: *Mariner c spacecraft, *Spacecraft television, *Television cameras, Imaging techniques, Impact resistance, Sterilization.

For abstract, see STAR 06 09.
N68-19320 HC$3.00 MF$0.65

SOME ARGUMENTS FAVORING NON-CONVENTIONAL TYPES OF COMPUTERS.
National Aeronautics and Space Administration. Electronics Research Center, Cambridge, Mass.

W. A. Lea. Mar 68, 35p NASA-TM-X-1544
Contract 125-23-02-31

Descriptors: *Computer design, *Machine oriented languages, *Problem solving, Analog computers, Bionics, Computer components, Computer programs, Digital computers, Human performance, Logic design, Logical elements, Pattern recognition.

For abstract, see STAR 06 09.
N68-19336 HC$3.00 MF$0.65

APPLICATION OF AASHO ROAD TEST RESULTS TO DESIGN OF FLEXIBLE PAVEMENTS IN MINNESOTA.
Minnesota Univ., Minneapolis. Dept. of Civil Engineering.
For primary bibliographic entry see Field 13B.
PB-177 375 HC$3.00 MF$0.65

MATHEMATICAL MODELS FOR EDUCATIONAL PLANNING.
System Development Corp., Santa Monica, Calif.
For primary bibliographic entry see Field 51.
PB-177 729 HC$3.00 MF$0.65

MAJOR AND MINOR THRESHOLD FUNCTIONS OF SIX VARIABLES.
Masters thesis,
Illinois Univ., Urbana. Dept. of Computer Science.
John A. Rohr. 17 Jun 67, 31p Rept. no. 234

Descriptors: (*Computer logic, *Special functions (Mathematical)), Linear programming, Optimization, Algorithms, Programming (Computers), Theses.
Identifiers: Threshold functions.

Switching circuits based on the threshold and majority decision principles have recently been used in certain computers. The behavior of these circuits can be represented by a Boolean function whose value is 1 or 0 (corresponding to 'on' and 'off') depending on whether the weighted sum of the variables is or is not greater than a specified value called the threshold. This investigation has two main objectives: (1) The tabulation of all the representative major and minor threshold functions of six and fewer variables; and (2) The comparison of the corresponding optimum structures obtained by minimizing the threshold, and the total input weight. (Author)
PB-177 756 HC$3.00 MF$0.65

9C. Electronic and Electrical Engineering

HIGH-SPEED INDUCTION MOTOR SIMULATION.
Army Mobility Equipment Research and Development Center Fort Belvoir Va
For primary bibliographic entry see Field 21C.
AD-666 762 HC$3.00 MF$0.65

A FIELD SURVEY OF ELECTRONIC MAINTENANCE TECHNICAL DATA.
Applied Science Associates Inc Valencia Pa
For primary bibliographic entry see Field 5I.
AD-666 990 HC$3.00 MF$0.65

A METHOD FOR THE DESIGN OF STABLE NONLINEAR FEEDBACK SYSTEMS,
Northwestern Univ Evanston Ill
G. J. Murphy. 1967, 8p
AFOSR-68-0624
Contract N00014-67-A-0356-0003, Grant AF-AFOSR-270-65
Availability: Published in Proceedings of the National Electronics Conference, v23 p108-13 1967.

Descriptors: (*Electronic equipment, Design), (*Operations research, Control), Stability, Nonlinear systems, Feedback, Graphics, Transfer functions, Frequency, Response, Complex numbers, Amplifiers, Phase, Symposia.
Identifiers: *Control theory.

A new chart and a new tool, both of which are designed to facilitate the application in practice of a modification of Popov's stability criterion, are presented. A simple and straightforward engineering procedure for use of this chart and this tool in designing stable nonlinear feedback systems is presented also, and the use of the method is illustrated by example. (Author)
AD-667 102 Not available from CFSTI.

INTENTIONAL NONLINEARITY IN A STATE VARIABLE FEEDBACK SYSTEM.
Arizona Univ., Tucson.
H. B. Parekh. 25 Aug 67, 91p NASA-CR-93412
Contract NGR-03-002-115

Descriptors: *Feedback control, *Nonlinearity, *Optimal control, *Servomechanisms, Analog computers, Computer programs, Differential equations, Functions (mathematics), Information theory, Linear systems, Nonlinear feedback, Systems analysis, Theses, Transformations (mathematics).

For abstract, see STAR 06 09.
N68-18350 HC$3.00 MF$0.65

A STUDY OF THE POSSIBLE USES OF PLASMA FOR MILLIMETER WAVE GENERATION.
National Aeronautics and Space Administration. Electronics Research Center, Cambridge, Mass.
For primary bibliographic entry see Field 20I.

For abstract, see STAR 06 09.
N68-18614 HC$3.00 MF$0.65

RESEARCH IN THE GENERAL AREA OF NONLINEAR DYNAMICAL SYSTEMS FINAL REPORT, 8 JUN. 1965 - 8 JUN. 1967.
Brown Univ., Providence, R. I. Div. of Applied Mathematics.
H. Hermes, J. J. Hurt, E. F. Infante, J. P. La Salle, and K. R. Meyer. 20 Jun 67, 454p NASA-CR-61632
Contract NAS8-11264

Descriptors: *Dynamic stability, *Integral equations, *Invariance, *Liapunov functions, *Nonlinear systems, *Research projects, Automatic control, Bibliographies, Differential equations, Dynamic programming, Electric networks, Periodic functions.

For abstract, see STAR 06 09.
N68-18811 HC$3.00 MF$0.65

SQUID-360 - A MULTIGROUP DIFFUSION PROGRAM WITH CRITICALITY SEARCHES FOR THE IBM-360.
Fiat S.P.A., Turin (Italy).
For primary bibliographic entry see Field 18K.
For abstract, see STAR 06 09.
N68-18960 HC$3.00 MF$0.65

WIDEBAND TELEVISION RECORDER FINAL REPORT.
Radio Corp. of America, Camden, N. J. Communications Systems Div.
For primary bibliographic entry see Field 14C.
For abstract, see STAR 06 09.
N68-19047 HC$3.00 MF$0.65

A REPORT ON SESSION 12 IFAC CONGRESS, 1966.
Brown Univ., Providence, R. I. Center for Dynamical Systems.
J. P. La Salle. 1966, 10p NASA-CR-76591
Contract NGR-40-002-015

Descriptors: *Abstracts, *Feedback control, *Nonlinear systems, *Optimal control, Conferences, Control equipment, Control stability, Difference equations, Differential equations.

For abstract, see STAR 06 09.
N68-19260 HC$3.00 MF$0.65

SENSITIVITY DESIGN TECHNIQUE FOR OPTIMAL CONTROL, PART C FINAL REPORT.
Rensselaer Polytechnic Inst., Troy, N. Y.
J. H. Rillings, and R. Roy. Oct 67, 16p NASA-CR-93527
Contract NGR-33-018-014

Descriptors: *Booster rocket engines, *Feedback control, *Optimal control, *Systems engineering, Bending moments, Differential equations, Mathematical models, Rigid structures, Sensitivity, Trajectory control.

For abstract, see STAR 06 09.
N68-19267 HC$3.00 MF$0.65

RESEARCH IN THE GENERAL AREA OF NONLINEAR DYNAMICAL SYSTEMS FINAL REPORT, 8 JUN. 1965 - 8 JUN. 1967.
Brown Univ., Providence, R. I. Div. of Applied Mathematics.
H. Hermes, J. J. Hurt, E. F. Infante, J. P. La Salle, and K. R. Meyer. 20 Jun 67, 390p NASA-CR-61629
Contract NAS8-11264

Descriptors: *Asymptotes, *Dynamic control, *Invariance, *Liapunov functions, *Nonlinear systems, Control stability, Differential equations, Feedback control, Integral equations, Lorentz transformations, Networks, Volterra equations.

For abstract, see STAR 06 09.
N68-19382 HC$3.00 MF$0.65

NEW SECOND-ORDER AND FIRST-ORDER ALGORITHMS FOR DETERMINING OPTIMAL CONTROL - A DIFFERENTIAL DYNAMIC PROGRAMMING APPROACH.
Harvard Univ., Cambridge, Mass. Div. of Engineering and Applied Physics.
D. H. Jacobson. Feb 68, 51p NASA-CR-93690, TR-551
Contracts NGR-22-007-068, N00014-67-A-0298-0006

Descriptors: *Dynamic programming, *Optimal control, *Partial differential equations, Algorithms, Computer programming, Inequalities, Mathematical models, Rayleigh equations.

For abstract, see STAR 06 09.
N68-19388 HC$3.00 MF$0.65

TEST SET, RADIO AN/ARM-53A AND AN/ARM-53B.
Technical manual instrument calibration procedure.
Naval Air Systems Command, Washington, D. C.
1 Nov 67, 31p NAVAIR-17-20ARM53-2

Descriptors: (*Radio equipment, Test sets), (*Test sets, Calibration), Instruction manuals, Noise generators, Accuracy, Power supplies, Transistor amplifiers, Radio frequency generators, Attenuators, Pulse generators, Tuning devices, Frequency modulation, Modification kits, Reliability.
Identifiers: AN/ARM-53A, AN/ARM-53B.

The manual describes the calibration of test set radio AN/ARM-53A and AN/ARM-53B. Since the procedures apply to both units, they will be referred to as test instrument A and test instrument B when a difference exists, or as test instrument when no difference exists. Section 1 describes the equipment. Section 2 presents the items of test equipment required to accomplish preliminary operations described in Section 3 and actual

calibration procedures contained in Section 4. Section 5 contains instructions on evaluating data taken. (Author)
PB-177 733 HC$3.00 MF$0.65

9D. Information Theory

INTERNATIONAL CONFERENCE ON METHODOLOGIES OF PATTERN RECOGNITION JANUARY 24, 25, 26, 1968.
Scientific Interim rept.,
Hawaii Univ Honolulu East-West Center for Cultural Exchange
Michael S. Watanabe. Jan 68, 64p
AFOSR-68-0515
Grant AF-AFOSR-68-1379

Descriptors: (*Pattern recognition, Symposia), Probability, Decision making, Artificial intelligence, Classification, Automatic, Adaptive systems, Decision theory, Learning, Geometry, Abstracts.

The document contains the program and abstracts of papers presented at the International Conference held at the University of Hawaii on January 24 - 26, 1968. The papers are concerned with theoretical foundations of pattern recognition methodologies, and consider, inter alia, the selection of variables, definitions of class features, limitations on domains of applicability of algorithms, assessments of decision-making procedures, and measures of goodness of variables. A proceedings volume is being undertaken. (Author)
AD-666 679 HC$3.00 MF$0.65

ON INTERCHANNEL CORRELATION IN COMMUNICATION WITH FEEDBACK.
Interim rept.,
State Univ of New York Stony Brook Coll of Engineering
Patrick Barry, and Peter M. Dollard. May 66, 26p
Rept nos. Scientific-1, TR-43
AFCRL-66-654
Contract AF 19 (628)-3865
See also Scientific report no. 2, AD-666 685.

Descriptors: (*Information theory, Sensitivity), Feedback, Attenuation, Performance (Engineering), Correlation techniques, Coding, Signal-to-noise ratio, Errors.

It has been firmly established in the literature that feedback offers a distinct improvement over conventional unidirectional communications systems in many cases, especially with channels subject to time varying statistics. Many of the analyses extant assume a noiseless, error-free feedback channel is available. Clearly this will not always be a valid assumption. Even in published results which include the effects of feedback errors, the possibility of interchannel correlation and its effects on performance have apparently never been considered. This paper undertakes to show that at least in some cases, some of the system performance measures exhibit a significant sensitivity to interchannel correlation of fading.
AD-666 683 HC$3.00 MF$0.65

THE FRAMING PROBLEM IN BLOCK CODED FEEDBACK COMMUNICATIONS SYSTEMS.
State Univ of New York Stony Brook Coll of Engineering
For primary bibliographic entry see Field 17B.
AD-666 685 HC$3.00 MF$0.65

DIGITAL DEVICES FOR AUTOMATIC CONTROL: MEASUREMENT AND GUIDANCE,
Foreign Technology Div Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 13H.
AD-666 726 HC$3.00 MF$0.65

PARAMETER ESTIMATION FOR STOCHASTIC SIGNALS WHICH ARE COHERENT IN PAIRS,
Michigan Univ Ann Arbor Inst of Science and Technology
Ferrell G. Stremler. Feb 68, 21p Rept no. 6400-150-T
ECOM-00013-150
Contract DA-28-043-AMC-00013 (E)
Continuation of Contracts DA-36-039-sc-78801, DA-36-039-sc-52654.

Descriptors: (*Army operations, *Combat surveillance), (*Information theory, Stochastic processes), (*Radar signals, Detection), Optical equipment, Sensors, Statistical processes, Signal-to-noise ratio, Correlation techniques.
Identifiers: Michigan project, Gaussian noise, Maximum likelihood, Parameter estimation, Coherent signal pairs.

A general expression for the likelihood functional for the coherent multiple-sensor problem is developed using Gaussian statistics on both signal and noise. With strongly correlated stochastic signals, a singularity problem arises; to avoid this difficulty, a complex representation for the signal is used, and the likelihood functional is averaged over the real and imaginary parts of the signal. A solution to the likelihood equation for an estimate of the parameter change between signals and a bound on the variance are found. An example of a two-sensor problem in phase-difference estimation is also given. (Author)
AD-666 777 HC$3.00 MF$0.65

MAXIMAL-RATIO DIVERSITY COMBINERS,
Hawaii Univ Honolulu Dept of Electrical Engineering
N. Thomas Gaarder. Dec 67, 10p
AFOSR-68-0509
Grant AF-AFOSR-1251-67
Prepared in cooperation with Stanford Research Inst., Menlo Park, Calif. Research supported in part by ECOM, Contract DA-36-039-AMC-00034 (E).
Availability: Published in IEEE Transactions on Communication Technology, v-com-15 n6 p790-7 1967.

Descriptors: (*Information theory, Data transmission systems), Multipath transmission, Attenuation, Phase shift, Random variables, Invariance, Time, Radio communication systems, Radio signals, Signal-to-noise ratio, Filters (Electromagnetic wave), Statistical processes.
Identifiers: Combining circuits.

A diversity combiner with a structure which is common to many communication systems is described. When the combiner inputs are independent and identically distributed narrowband Gaussian random processes and the reference signals are time-invarient, it is found that the combiner output can conveniently represented as a function of a Gaussian random process, a chi-square variate, Gaussian variate, and known time functions. This representation clearly indicates the performance gain from diversity. In addition, it simplifies the evaluation of expectations of functions of the combiner output; recursion relations, with respect to the order of diversity, are found for these expectations. The results of this paper thus serve to unify and generalize many other results dealing with maximal-ratio diversity combiners; extensions of many well-known results can also be found by using the recursion relations. (Author)
AD-666 860 Not available from CFSTI.

AN ADAPTIVE MULTICATEGORY PATTERN CLASSIFICATION SYSTEM.
Technical rept.,
Texas Univ Austin Labs for Electronics and Related Science Research
James Michael Pitt, and B. F. Womack. 22 Jan 68, 106p Rept no. TR-43
AFOSR-68-0279
Grant AF-AFOSR-766-67

Descriptors: (*Pattern recognition, Adaptive systems), (*Decision theory, Pattern recognition), Classification, Random variables, Statistical analysis, Matrix algebra, Convergence, Sequences, Probability, Functional analysis, Theorems.
Identifiers: Discriminant functions, Adaptive pattern classification system.

An adaptive, multicategory, pattern classification system for classifying statistical patterns is formulated. The system finds application in those instances when the probability densities and a priori probabilities of occurrence of the classes are unknown. The convergence rate and other special properties of the system are examined, including the special case where the expected loss due to misclassification by the system tends to the minimum expected loss which results when using the Bayes discriminant functions. In addition, a simulation of the system for a three-category problem using quadratic discriminant functions is presented. (Author)
AD-666 898 HC$3.00 MF$0.65

ASYMPTOTICALLY OPTIMAL DISCRIMINANT FUNCTIONS FOR PATTERN RECOGNITION.
Texas Univ Austin Labs for Electronics and Related Science Research
For primary bibliographic entry see Field 12B.
AD-666 900 HC$3.00 MF$0.65

A SURVEY OF PROGRESS IN CODING THEORY IN THE SOVIET UNION.
Final rept.,
Stanford Research Inst Menlo Park Calif
William H. Kautz, and Karl N. Levitt. Dec 67, 158p
AFOSR-68-0590
Contract F44620-67-C-0026

Descriptors: (*Information theory, Reviews), Coding, Decoding, Programming (Computers), Sequences, Remote control systems, Cybernetics, Bibliographies, USSR.
Identifiers: Error correcting codes, Pseudo-random sequences.

Described in this report are the results of a comprehensive technical survey of all published Soviet literature in coding theory and its applications--over 400 papers and books appearing before March 1967. The purpose of this report is to draw attention to this important collection of technical results, which are not well known in the West, and to summarize the significant contributions. Particular emphasis is placed upon those results that fill gaps in the body of knowledge about coding theory and practice as familiar to non-Soviet specialists. (Author)
AD-666 917 HC$3.00 MF$0.65

ON THE OPTIMUM SYNTHESIS OF STATISTICAL COMMUNICATION NETS-PSEUDO PARAMETRIC TECHNIQUES,
Northwestern Univ Evanston Ill
S. L. Hakimi, and H. Frank. Mar 68, 12p
AFOSR-68-0543
Grant AF-AFOSR-98-63
Prepared in cooperation with California Univ., Berkeley, grant DA-ARO (D)-31-124-G776.
Availability: Published in Journal of the Franklin Inst., v284 n6 p407-16 Dec 1967.

Descriptors: (*Information theory, Networks), (*Statistical analysis, Information theory), Linear programming, Optimization, Probability, Costs.
Identifiers: Probability distributions, Integer programming.

In a communication network, the existing traffic within the branches is not deterministic. As part of the synthesis problem, it is necessary to determine the probability that a particular flow rate can be attained between a given pair of stations. If this probability is inadequate, we must improve the net with minimum cost. This paper offers an approach based on the assumption that the branch

flows are observable but their probability distributions are unknown. An analysis technique that uses statistical hypothesis testing is developed. Following the statistical analysis procedure, a synthesis technique is presented which is optimum in the sense that the net is improved at minimum cost while the statistical errors in the procedure are controlled. The synthesis procedure utilizes linear integer programming and seems to be feasible for reasonably 'large' communication networks. (Author)
AD-667 055 Not available from CFSTI.

DECODING OF GRAPH THEORETIC CODES,
Northwestern Univ Evanston Ill Dept of Electrical Engineering
J. G. Bredeson, and S. L. Hakimi. Mar 68, 4p
AFOSR-68-0551
Contract N00014-66-C-0020-A03, Grant AF-AFOSR-98-65
Availability: Published in IEEE Transactions on Information Theory, v1T13 n2 p348-9 Apr 1967.

Descriptors: (*Information theory, Graphics), Coding, Decoding, Errors, Set theory, Symbols, Theorems.
Identifiers: *Graph theoretic codes, Error correcting codes, Threshold.

The purpose of this correspondence is to show that graph theoretic codes are threshold, or more specifically, majority decodable. (1) In a forthcoming paper, we intend to present a rather complete study of graph theoretic codes, their efficiency, their error correcting capability, their limitations, and their generalizations. (Author)
AD-667 103 Not available from CFSTI.

9E. Subsystems

MULTIPLE QUANTUM TRANSITION DEVICE FEASIBILITY STUDY.
Final rept. 20 Mar 64-20 Mar 65,
Kane Engineering Labs., Palo Alto, Calif.
Robert N. Wilson. Sep 65, 185p
RADC-TR-65-207
Contract AF 30 (602)-3351

Descriptors: (*Frequency converters, Molecular electronics), (*Quantum mechanics, Molecular structure), Radiofrequency, Solid state physics, Frequency multipliers, Motion, Equations, Molecular properties, Feasibility studies, Masers, Mathematical analysis, Electromagnetism, Electromagnetic properties, Density, Adsorption, Mathematical models, Mathematical prediction, C Band, K Band.

Density matrix methods are used to formulate the equation of motion of multi-level molecular objects in a form suitable for the analysis of coherent frequency multiplication. Variables closely related to physical observable are introduced to reduce the equations of motion to a more lucid and tractable form. The theory of frequency tripling utilizing two-level systems is developed for cavity type extended-interaction electromagnetic structures. This development which makes use of a combination of truncation approximation and resonance approximation serves as a model for the treatment of three and four-level molecules. The analysis also represents a first attempt at a complete design theory for frequency multiplication in extended-interaction structures. (Author)
AD-469 926 HC$3.00 MF$0.65

SPATIAL FREQUENCY FILTERING.
Michigan Univ., Ann Arbor. Inst. of Science and Technology.
For primary bibliographic entry see Field 17E.
AD-480 352 HC$3.00 MF$0.65

GRIDDED AMPLIFIER TUBES FOR PULSED C-BAND FREQUENCIES.
Quarterly progress rept. no. 2, 15 Dec 65-14 Mar 66,
Machlett Labs., Inc., Springdale, Conn.
W. Brunhart, and A. Pineau. Jul 66, 23p EP-715-2 ECOM-01665-2
Contract DA-28-043-AMC-01665 (E)

Descriptors: (*Microwave amplifiers, *Triodes), Broadband, C band, Gain, Cathodes (Electron tubes), Failure (Electronics), Aging (Materials), Life expectancy, Circuits.

A number of tubes were assembled to evaluate the static characteristics and the progress of the grid development and to study the effects of very close spacings. Additional analysis was done with respect to the combination of the tube and circuitry. Based on the results, it was decided to concentrate future efforts along the lines of a coaxial cavity with a new tube configuration. The new tube type is designed to be part of a cavity section and with this, it is expected that it will present a minimum of discontinuities in the circuit.
AD-485 173 HC$3.00 MF$0.65

COMPLEMENTARY INSULATED GATE FIELD EFFECT TRANSISTOR CIRCUITS.
Masters thesis,
Air Force Inst of Tech Wright-Patterson AFB Ohio School of Engineering
Jon Christian Zimmerman. Nov 67, 111p Rept no. GE/EE/67S-9

Descriptors: (*Field effect transistors, Circuits), Theses, Transfer functions, Negative resistance circuits, Gates (Circuits), Voltage, Performance (Engineering), Computer programs.
Identifiers: Complementary circuits, Bipolar transistors, Computer analysis.

New circuits of higher order complementarity were investigated. Ten of these circuits exhibited unusual static volt-ampere characteristics. At least two applications were found for each circuit. Ten linear and digital applications were found for one circuit; it also exhibited an extensive negative resistance region. A discussion of various types (orders) of complementarity is presented and a list of properties for determining the order of complementarity is proposed. The study demonstrated the existence of a correlation between complementarity and versatility. However, additional research is needed to explore further the exact nature of this correlation. (Author)
AD-666 645 HC$3.00 MF$0.65

DIGITAL DEVICES FOR AUTOMATIC CONTROL: MEASUREMENT AND GUIDANCE,
Foreign Technology Div Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 13H.
AD-666 726 HC$3.00 MF$0.65

SYNTHESIS AND MINIMIZATION OF DIAGRAMS WITH REAL LOGICAL ELEMENTS OF THE TYPE AND-NOT OR OR-NOT,
Foreign Technology Div Wright-Patterson AFB Ohio
E. A. Yakubaitis, and N. P. Shmaukstel. 10 Aug 67, 10p Rept no. FTD-HT-67-74
Unedited rough draft trans. of Akademiya Nauk Latviiskoi SSR, Riga. Institut Elektroniki i Vychislitelnoi Tekhniki. Trudy, v9 p145-8 1965, tr. by E. Harter.

Descriptors: (*Logic circuits, Algebras), Errors, Time, Switching circuits, Algorithms, Special functions (Mathematical), Optimization, Synthesis, USSR.
Identifiers: Translations.

By real logical elements is meant elements which have a time of operation which is not equal to zero. In the making of diagrams that are not constructed on such elements, at the time of transitions from cycle to cycle there may occur contests leading sometimes to errors in the working of the diagram. To the contests which arise in some transitions there corresponds in the logical formula, which describes the working of the diagram, the disjunction or conjunction of two or more terms whose value at least for one in this transition changes from 0 to 1 and for at least one from 1 to 0. With the presence of such terms the contests are termed hazardous. In this article there is provided a method for the synthesis of the diagrams on real AND-NOT or OR-NOT, which is based on the use of the same algorithms.
AD-666 735 HC$3.00 MF$0.65

HIGH PERFORMANCE THIN FILMS FOR MICROCIRCUITS.
Quarterly rept. no. 11, 1 Sep-30 Nov 67,
Radio Corp of America Somerville N J Defense Microelectronics
Morton L. Topfer, Joseph H. Mitchell, and Robert L. Schelhorn. Mar 68, 41p
ECOM-01230-11
Contract DA-28-043-AMC-01230 (E)
See also AD-622 748.

Descriptors: (*Integrated circuits, Films), Oxides, Hafnium compounds, Oxides, Resistors, Sputtering, Anodic coatings, Silicon, Substrates, Circuits, Microminiaturization (Electronics), Metal coatings.
Identifiers: Hafnium oxide, Metal oxide semiconductors, Thin films.

The TCR-vs.-ohms/sq. curve for hafnium thin-film resistors prepared on glass substrates is plotted and compared to that of samples prepared on glazed ceramic substrates. A technique for forming fine-line (0.5 mil) resistor patterns of hafnium has been developed. MOM capacitors and chip-size resistors using hafnium technology and related anodization processing were fabricated on passivated silicon wafers. Details of the work on hafnium-dioxide insulated MOS devices are presented. In addition, evaluation of the hafnium-dioxide films using C-V measurements is reported. A multivibrator circuit has been chosen as an experimental vehicle. The layout and masks for this circuit are presented. (Author)
AD-666 776 HC$3.00 MF$0.65

A PROPOSED ANALOG TO DIGITAL CONVERTER FOR SMALL EARTH SATELLITES.
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
For primary bibliographic entry see Field 22B.
AD-666 811 HC$3.00 MF$0.65

THE SLOWLY VARYING CONDITION IN NONLINEAR FILTERED CIRCUITS,
Army Electronics Command Fort Monmouth N J Electronic Components Lab
Erich Hafner. 1968, 3p
Availability: Published in Proceedings of the IEEE, v56 n1 p129-31 Jan 1968.

Descriptors: (*Circuits, Electric filters), Nonlinear systems, Perturbation theory, Integral transforms, Differential equations, Resonance, Electrical impedance, Transients, Oscillators, Simultaneous equations.

It is shown that the 'slowly varying condition' allows a consistent separation of the linear differential equation with time-varying coefficients describing the perturbation of an oscillation in a nonlinear filtered circuit into a set of coupled linear differential equations with constant coefficients. (Author)
AD-667 119 Not available from CFSTI.

INVESTIGATIONS OF BROADBAND FERROMAGNETIC POWER LIMITERS AND EXPANDERS AS DUPLEXING ELEMENTS FOR MICROWAVE SYSTEMS.
Quarterly progress rept. no. 1, 1 Jun-31 Aug 66,
Microwave Electronics, Palo Alto, Calif.
Kunda Mehta, and F. A. Olson. Dec 66, 24p
ECOM-02120-1
Contract DA-28-043-AMC-02120 (E)

Descriptors: (*Limiters, *Duplexers (Electronic)), Electromagnetic waves, Ferromagnetic materials, Strontium compounds, Titanates, Broadband, Propagation.

Extensive theoretical and preliminary experimental studies were undertaken to identify efficient coupling methods to the magnetostatic modes used in the traveling wave limiter in order to reduce the insertion loss while maintaining broad bandwidth. The theory of magnetostatic wave propagation has been extended and is presented in detail for an axially-magnetized, long ferrimagnetic cylinder surrounded by metal walls, and for a rectangular, shielded sample with transverse magnetization. As a result of the theoretical analysis one of the possible approaches to obtain broadband limiting with low insertion loss is to excite only the lowest-order surface mode with broadband matching circuits. Theoretical considerations show that a bandwidth well over an octave can be expected. Results of the preliminary experiments using strontium titanate as a coupling circuit are presented. (Author)
AD-805 179 HC$3.00 MF$0.65

EVALUATION OF FLIP/CHIP INTEGRATED CIRCUIT INTERCONNECTIONS.
Honeywell, Inc., Framingham, Mass. Computer Control Div.
For primary bibliographic entry see Field 13H.
AD-806 935 HC$3.00 MF$0.65

INVESTIGATIONS OF BROADBAND FERROMAGNETIC POWER LIMITERS AND EXPANDERS AS DUPLEXING ELEMENTS FOR MICROWAVE SYSTEMS.
Quarterly progress rept. no. 2, 1 Sep-30 Nov 66,
Microwave Electronics, Palo Alto, Calif.
Peter Young, and F. A. Olson. Mar 67, 33p
ECOM-02120-2
Contract DA-28-043-AMC-02120 (E)

Descriptors: (*Limiters, Broadband), (*Electromagnetism, Ferromagnetic materials), Transducers, Yttrium, Iron, Garnet, Rods, Dielectrics, Magnetism, Statics, Electromagnetic waves, Propagation, S band, Strontium compounds, Titanium compounds, Oxides, Resonators, Waveguides, Duplexers (Electronic).
Identifiers: Expanders (Electronics).

The dispersion relationships for both the lowest order surface magnetostatic mode in a square yig rod and the dipolar mode in a dielectric rod were calculated. It is possible to choose the dimensions of the yig rod and the dielectric rod such that the two modes become degenerate over a range of frequency that is suitable for S-band limiter application. Furthermore, it is possible to match the transverse field configuration of these two modes. A wideband coupling from electromagnetic wave into surface magnetostatic wave can be realized, provided the coupling coefficient between the modes is frequency independent. Coupling between dielectric mode and surface magnetostatic mode was observed, in a transmission type experiment, by placing a cylindrical yig rod between two identical SrTiO2 resonators. The coupling is strong in a narrow frequency band, due to the characteristics of the dielectric resonator. However, the experiment does confirm the possibility of exciting the lowest order surface magnetostatic mode by dielectric mode. (Author)
AD-809 080 HC$3.00 MF$0.65

INVESTIGATIONS OF BROADBAND FERROMAGNETIC POWER LIMITERS AND EXPANDERS AS DUPLEXING ELEMENTS FOR MICROWAVE SYSTEMS.
Quarterly progress rept. no. 3, 1 Dec 66-28 Feb 67,
Microwave Electronics, Palo Alto, Calif.
Peter Young, and F. A. Olson. Jun 67, 34p
ECOM-02120-3
Contract DA-28-043-AMC-02120 (E)

Descriptors: (*Limiters, Duplexers (Electronic)), Traveling-wave tubes, Ferromagnetic materials, Single crystals, Yttrium, Iron, Garnet, Dielectric properties, Waveguides, Broadband, Helixes, Rutile.
Identifiers: Yig, Junction (electronics).

A traveling-wave limiter has been designed. A single-crystal YIG slab was placed in a dielectric-loaded waveguide, and the coupling between the waveguide mode and n=1 surface magnetostatic mode was calculated. The length of the YIG slab needed for converting electromagnetic energy into magnetostatic energy over a fairly broad frequency range was calculated. Experiments are being conducted to test the possibility of using this device as the broadband, low-level microwave limiter. The performance of an expander using a ferrite sphere inside a helix, has been evaluated. The loss inside the helix structure has been identified.
AD-816 274 HC$3.00 MF$0.65

INVESTIGATION OF REFRACTORY DIELECTRICS FOR INTEGRATED CIRCUITS.
International Business Machines Corp., Cambridge, Mass.
For primary bibliographic entry see Field 20L.
For abstract, see STAR 06 09.
N68-18849 HC$3.00 MF$0.65

SOLID STATE IMAGE SENSOR RESEARCH, PHASE 2.
General Electric Co., Syracuse, N. Y. Electronics Lab.
For primary bibliographic entry see Field 9A.
For abstract, see STAR 06 09.
N68-19209 HC$3.00 MF$0.65

9F. Telemetry

TABLES OF E (h,z), C (h,z), S (h,z),
Harvard Univ., Cambridge, Mass. Cruft Lab.
Richard B. Mack, and Evelyn W. Mack. 1 Nov 60, 136p TR-331
Contract Nonr-1866 (32)

Descriptors: (*Antenna radiation patterns, Tables), Naval research, Antenna arrays, Analytic functions, Mathematical analysis, Theory.
Identifiers: Linear antennas, Circular antennas.
AD-253 464 HC$3.00

ELECTRO-OPTICAL SIGNAL PROCESSING TECHNIQUES FOR PHASED ARRAY ANTENNAS.
Quarterly Progress rept. 1 Jan-31 Mar 64,
Columbia Univ., New York. Electronics Research Labs.
A. Aimette, and M. Arm. Apr 64, 34p P-2/199
Contract AF 49 (638)-1113

Descriptors: (*Electrooptical photography, Light transmission), (*Antennas, Phased arrays), Modulators, Signals, Photomultipliers, Antenna simulators, Transducers, Circuits, Recording systems.
Identifiers: Optical signal processor.

The research program for an electro-optical signal processor for phased array antennas is continued. In this phase of the program, particular emphasis is placed on the 'spatial multiplexing' technique and the resulting sidelobe response of the system. The theoretical envelope response for a cosine amplitude weighted aperture utilizing a channel separator mask is presented. New techniques and equipment developed to facilitate the measurements of the resolution and sidelobe response of the system are discussed. This includes the 24-channel input signal simulator, the mechanical scan mechanism, x-y recorder and a 40-db dynamic range photomultiplier circuit. (Author)
AD-440 342 HC$3.00 MF$0.65

HARP 250 MC TELEMETRY EXPERIMENTS, JUNE-OCTOBER 1964.
Memorandum rept.,
Ballistic Research Labs., Aberdeen Proving Ground, Md.
W. H. Mermagen. Nov 64, 70p BRL-MR-1614

Descriptors: (*Telemeter systems, Meteorological data), Thermistors, Sounding rockets, Atmospheric sounding, Checkout procedures, Temperature, Barometic pressure, Magnetometers, Nose cones, Glass textiles, Telemetering antennas, Telemetering transmitters, Automatic gain control.
Identifiers: Harp project.

High Altitude Research Project (HARP) firings were conducted both at Wallops Island, Virginia and Barbados, West Indies during the months of June through October 1964. A substantial number of these firings included high-'g' telemetry experiments. Three telemetry payloads were flown at Wallops in June and July, and three more in October. During the month of July, thirteen telemetry vehicles were flown at Barbados. The telemetry experiments were highly successful. Five of the six payloads flown at Wallops functioned and four gave data. Nine of the thirteen units fired at Barbados survived the high-'g' launch. Seven of these successfully transmitted data. The results of measurement are presented and include sunseeker data, event monitoring, temperature data, and the performance of magnetometers and pressure gates.
AD-459 576 HC$3.00 MF$0.65

ACTIVE AND ACOUSTIC LOW-PASS FILTERS FOR SUBCARRIER OSCILLATORS IN HIGH-G TELEMETRY,
Harry Diamond Labs Washington D C
Robert E. Elmore. Dec 67, 26p Rept no. HDL-TM-67-24

Descriptors: (*Low-pass filters, *Telemeter systems), Acoustic filters, Design, Oscillators, Standards.
Identifiers: Subcarriers.

As part of telemetry research, a low-cost, low-distortion, active, low-pass filter was designed, built, and tested to replace the LC low-pass filter in IRIG subcarrier oscillators. An acoustic filter, which could be used instead of the electrical filter, was also designed, but it has not been built. (Author)
AD-666 754 HC$3.00 MF$0.65

A PROPOSED ANALOG TO DIGITAL CONVERTER FOR SMALL EARTH SATELLITES.
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
For primary bibliographic entry see Field 22B.
AD-666 811 HC$3.00 MF$0.65

WAVEFORM DISTORTION IN A MAXIMUM-LIKELIHOOD DARLINGTON DETECTOR FOR M-ARY PFM SIGNALS.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
P. J. Heffernan. Mar 68, 36p NASA-TN-D-4294
Contract 160-44-05-14-51
36 P Refs

Descriptors: *Pulse communication, *Pulse frequency modulation telemetry, *Signal distortion, *Spacecraft communication, Bibliographies, Feasibility, Fourier analysis, Linear systems, Multichannel communication, Multiplexing, Phase deviation, Real time operation, Waveforms.

For abstract, see STAR 06 09.
N68-18542 HC$3.00 MF$0.65

THIN- FILM PERSONAL COMMUNICATIONS AND TELEMETRY SYSTEM (TFPCTS), PHASE B QUARTERLY REPORT, 24 JUN. - 24 SEP. 1966.
Melpar, Inc., Falls Church, Va.
Oct 66, 37p NASA-CR-65989, QR-2
Contract NAS9-3924

Descriptors: *Electronic modules, *Feedback amplifiers, *Low pass filters, *Thin films, *Voltage regulators, Diplexers, Electronic packaging, Frequency modulation, Printed circuits, Radio transmitters, Resistors, Telemetry.

For abstract, see STAR 06 09.
N68-18543 HC$3.00 MF$0.65

A QUASI-OMNIDIRECTIONAL SLOT ARRAY ANTENNA FOR SPACECRAFT USE AT MICROWAVE FREQUENCIES.

National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
W. F. Croswell, D. M. Hatcher, and C. M. Knop.
Mar 68, 60p NASA-TN-D-4362
Contract 125-22-02-02-23

Descriptors: *Antenna arrays, *Omnidirectional antennas, *Slot antennas, *Waveguides, Bypasses, Circuits, Dielectrics, Microwave frequencies, Plasma sheaths, Reentry communication, Resonant frequencies.

For abstract, see STAR 06 09.
N68-18616 HC$3.00 MF$0.65

RADAR ATTENUATION MEASUREMENTS FINAL REPORT, 16 NOV. 1964 - 15 MAY 1965.
Thiokol Chemical Corp., Huntsville, Ala.
For primary bibliographic entry see Field 17B.
For abstract, see STAR 06 09.
N68-18664 HC$3.00 MF$0.65

THIN FILM PERSONAL COMMUNICATIONS AND TELEMETRY SYSTEM (TFPCTS), PHASE C QUARTERLY REPORT, 24 MAR. - 24 JUN. 1967.
Melpar, Inc., Falls Church, Va.
Jul 67, 15p NASA-CR-65988, QR-1
Contract NAS9-3924

Descriptors: *Electronic packaging, *Radio equipment, *Silicon oxides, *Thin films, *Transmitter receivers, Coupling circuits, Electronic modules, Radio frequencies, Semiconductor devices, Silicon films.

For abstract, see STAR 06 09.
N68-18780 HC$3.00 MF$0.65

DEVELOPMENT OF CHECKOUT SPECIFICATIONS FOR NEW TELEMETER SYSTEMS, PHASE B.
Boeing Co., Seattle, Wash. Space Div.
R. W. Ekis. 5 Mar 68, 111p NASA-CR-61586, D5-13402-1
Contract NAS8-21205

Descriptors: *Apollo applications program, *Checkout, *Telemetry, Command and control, Data transmission, Ground support equipment, Maintenance, Pulse amplitude modulation, Pulse code modulation, Specifications, Test equipment.

For abstract, see STAR 06 09.
N68-18979 HC$3.00 MF$0.65

A FEASIBILITY STUDY OF SIGNAL PROCESSING TO IMPROVE ANTENNA GAIN FINAL REPORT.
Raytheon Co., Norwood, Mass. Equipment Div.
W. J. Bickford, R. G. Cease, H. J. Rowland, and C. K. Tsao. Nov 67, 56p NASA-CR-86038, CDP-TR-4
Contract NAS12-529

Descriptors: *Adaptive control, *Antenna arrays, *Phase control, *Signal analyzers, *Signal processing, Attenuators, Communication theory, Error signals, Isolators, Mathematical models.

For abstract, see STAR 06 09.
N68-19069 HC$3.00 MF$0.65

DESIGN AND CALIBRATION OF LOW FREQUENCY RADIO ASTRONOMY SPACE PROBES.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
R. R. Weber. Feb 68, 38p NASA-TM-X-63129, X-615-68-73

Descriptors: *Calibrating, *Radio astronomy, *Space probes, Dipole antennas, Impedance, Low frequencies, Noise spectra, Radio receivers, Radio sources (astronomy), Signal to noise ratios.

For abstract, see STAR 06 09.
N68-19081 HC$3.00 MF$0.65

MRIR-PCM TELEMETRY UNIT FINAL ENGINEERING REPORT.
California Computer Products, Inc., Anaheim.
5 Apr 67, 100p NASA-CR-93509, D0301-019
Contract NAS5-10215

Descriptors: *Infrared instruments, *Nimbus satellites, *Pulse code modulation, *Radio telemetry, *Radiometers, Analog to digital converters, Electronic equipment tests, Printed circuits, Spacecraft electronic equipment.

For abstract, see STAR 06 09.
N68-19208 HC$3.00 MF$0.65

DESIGN STUDY OF THE JPL S-BAND TURNAROUND RANGING TRANSPONDER FINAL ENGINEERING REPORT.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. Philco Corp., Palo Alto, Calif. Space and Reentry Systems Div.
1 Nov 67, 219p NASA-CR-93669, TR-DA1522A
Contracts NAS7-100, JPL-951290
Prep- Preparedfor Jpl

Descriptors: *Rangefinding, *Superhigh frequencies, *Transponders, *Ultrahigh frequencies, Broadband amplifiers, Mariner c spacecraft, Phase shift, Spacecraft electronic equipment, Time lag.

For abstract, see STAR 06 09.
N68-19390 HC$3.00 MF$0.65

10. ENERGY CONVERSION (NON-PROPULSIVE)

10A. Conversion Techniques

POWER MACHINERY MANUFACTURE, NO. 1, 1966. SELECTED ARTICLES.
Foreign Technology Div Wright-Patterson AFB Ohio
26 Sep 67, 23p Rept no. FTD-HT-67-52
Edited trans. of Energomashinostroenie (USSR) n1 p21-2, 28-30 1966.

Descriptors: (*Turbines, Performance (Engineering)), Turbine parts, Velocity, Hydraulic systems, Shafts, Design, Vibration, Torsion, USSR.
Identifiers: Translations, Hydroturbines.

Contents: Determination of the critical velocities of hydraulic turbine shafts; The effect of radial clearance on turbine performance.
AD-666 739 HC$3.00 MF$0.65

FABRICATION AND PROPERTIES OF CHEMICAL VAPOR DEPOSITED NB LAYERS ON AL2 O3 BODIES FOR THERMIONIC APPLICATION.
European Atomic Energy Community, Ispra (Italy).
P. Fiebelmann. Feb 68, 21p EUR-3743.E

Descriptors: *Aluminum oxides, *Niobium, *Refractory metal alloys, *Sandwich structures, *Vapor deposition, Fabrication, Metal-metal bonding, Plates (structural members), Reduction (chemistry), Thermionic emission, Zinc.

For abstract, see STAR 06 09.
N68-18962 HC$3.00 MF$0.65

TWO STAGE POTASSIUM TURBINE - 3000 HOUR TEST FINAL REPORT.
General Electric Co., Cincinnati, Ohio. Missile and Space Div.
E. Schnetzer. Jul 67, 256p NASA-CR-72273
Contract NAS5-1143

Descriptors: *Auxiliary power sources, *Electric generators, *Rankine cycle, *Two stage turbines, *Vapor pressure, Performance tests, Potassium, Rotor blades (turbomachinery), Systems engineering, Turbine blades.

For abstract, see STAR 06 09.
N68-19007 HC$3.00 MF$0.65

DEPLOYABLE LARGE AREA SOLAR CELL ARRAY TESTING QUARTERLY REPORT.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. Ryan Aeronautical Co., San Diego, Calif. Electronic and Space Systems.
15 Jan 68, 73p NASA-CR-93670, REPT.-20867-1
Contracts NAS7-100, JPL-951107
Prep- Prepared for Jpl

Descriptors: *Solar cells, *Structural design, *Vacuum effects, Dynamic stability, Electrical properties, Engineering drawings, Fixtures, Supports, Thermal environments, Vibration effects.

For abstract, see STAR 06 09.
N68-19334 HC$3.00 MF$0.65

OPERATION OF SOLAR CELL ARRAYS IN DILUTE STREAMING PLASMAS.
TRW Systems, Redondo Beach, Calif.
R. K. Cole, H. S. Ogawa, and J. M. Sellen, Jr.. 15 Mar 68, 63p NASA-CR-72376, TRW-09357-6006-R000
Contract NAS3-10612

Descriptors: *Magnetohydrodynamic flow, *Plasma jet wind tunnels, *Solar cells, Cadmium sulfides, Drainage, Electrical insulation, Electron mobility, Epoxy resins, Magnetic effects, Silicon.

For abstract, see STAR 06 09.
N68-19356 HC$3.00 MF$0.65

LARGE AREA SOLAR ARRAY QUARTERLY REPORT.
Boeing Co., Seattle, Wash. Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. Aerospace Group.
J. L. Apperson, J. W. Ketchum, F. W. Mc Afee, and D. A. Norsen. Mar 68, 208p NASA-CR-93673, D2-113355-5
Contracts NAS7-100, JPL-951934
Prep- Prepared for Jpl

Descriptors: *Arrays, *Expandable structures, *Solar cells, Beryllium, Fabrication, Folding structures, Ground support equipment, Project management, Scheduling, Solar sails, Systems engineering.

For abstract, see STAR 06 09.
N68-19379 HC$3.00 MF$0.65

HEAT PIPE THERMIONIC CONVERTER DEVELOPMENT FINAL REPORT, 23 JUN. 1966 - 6 NOV. 1967.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. Thermo Electron Engineering Corp., Waltham, Mass.
P. Brosens. Dec 67, 115p NASA-CR-93664, TE4067-61-68
Contracts NAS7-100, JPL-951465
Prep- Prepared for Jpl

Descriptors: *Thermionic converters, *Tube heat exchangers, Environmental tests, Fabrication, Heat transfer, Thermal cycling tests.

For abstract, see STAR 06 09.
N68-19392 HC$3.00 MF$0.65

10B. Power Sources

FUEL CELL-ELECTRIC PROPULSION TEST RIG (MODIFIED M-37, 3/4-TON CARGO TRUCK).
Engineering rept. Jul 65-Dec 67.
Army Mobility Equipment Research and Development Center Fort Belvoir Va
Lonnie D. Gaddy, Jr. Feb 68, 49p Rept no. USAMERDC-1921

Group 10B — Power sources

Descriptors: (*Fuel cells, *Electric propulsion), (*Cargo vehicles, Electric propulsion), Storage batteries, Static dischargers, Electric motors, Control systems, Drives, Performance (Engineering).
Identifiers: *Electrically propelled vehicles, M-37 vehicles (3/4-ton).

This report covers a study to determine experimentally the feasibility and practicability of a fuel cell and electric drive propulsion system. The experimental data were obtained by testing the fuel cell test rig components and system. The report concludes that: The fuel cell and electric drive are feasible; the fuel cell-electric propulsion system performs satisfactorily; the use of a fuel cell as compared with other power plants such as a battery does not pose additional electrical problems; major technical advances are required. (Author)
AD-666 763 HC$3.00 MF$0.65

POWER SOURCES FOR ELECTRIC CARS.
Technical rept.,
Army Electronics Command Fort Monmouth N J
Galen R. Frysinger. Jan 68, 42p Rept no.
ECOM-2929

Descriptors: (*Passenger vehicles, *Electric propulsion), Power supplies, Batteries + components, Fuel cells, Energy management, Efficiency, Predictions.
Identifiers: *Electrically propelled vehicles.

An extrapolation, based on extensive experience with battery and fuel cell power sources during various Army programs, is made into the future world of the electric car and speculates on the power sources most suited as the electrical energy source. The conclusion is that both the battery and the fuel cell have their place when combined uniquely in a hybrid configuration which by proper design can provide outstanding characteristics. (Author)
AD-666 773 HC$3.00 MF$0.65

UNINTERRUPTIBLE POWER SYSTEM MODULE ANALYSIS.
Interim rept.,
Garrett Corp Torrance Calif Airesearch Mfg Div
E. R. Pledger. Nov 67, 74p
FAA-RD-67-62
Contract FA-67-WA-1748

Descriptors: (*Air traffic control systems, *Power equipment), Modules (Electronics), Electrical equipment, Power supplies, Redundant components, Reliability, Stability, Rectifiers, Inverters, Storage batteries, Power transformers, Stand-by generators, Diesel engines, Cost effectiveness.
Identifiers: Mean time between failures.

A module analysis was conducted to determine the optimum rating of module which, together with identical modules, would best satisfy the contractual requirements for an uninterruptible ac power (u-p) supply system for use in Federal Aviation Administration (FAA) Air Route Traffic Control Centers. In determining the optimum module output capacity, due consideration was given to incurring the lowest initial and recurring cost over a 10-year period, the possibility of future u-p supply installations at 18 other centers in addition to the present Islip, N.Y., installation under contract with regard to (1) their initial critical load magnitudes (98-381 kva); (2) ultimate loads of 500 kva; (3) ultimate loads of a presently indeterminable kva; and (4) the interchangeability of modules between Air Route Traffic Control Centers. Also considered in this analysis was a quantitative economic and operational determination of various module output capacities and module circuit configurations as they relate to critical loads of both a steady state and transient nature, electrical performance, efficiency, redundancy, maintainability, space and future expansion requirements, and reliability requirements. Six basic circuit configurations were investigated at power levels ranging from 50 kva modules to 250 kva modules. (Author)
AD-666 823 HC$3.00 MF$0.65

INTERACTION OF A TRAVELING MAGNETIC FIELD WITH RIGID CONDUCTING SPHERES OR CYLINDERS.
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
For primary bibliographic entry see Field 20C.
AD-667 122 Not available from CFSTI.

SOLAR-CELL INTEGRAL COVER-GLASS DEVELOPMENT PROGRESS REPORT, 1 JUN. - 31 AUG. 1967.
Texas Instruments, Inc., Dallas.
31 Aug 67, 28p NASA-CR-93410, REPT.-03-67-101
Contract NAS5-10319

Descriptors: *Protective coatings, *Silicon films, *Solar cells, *Sputtering, Epitaxy, Quartz, Radio frequencies, Silica glass, Silicon dioxide, Solar radiation, Thin films.

For abstract, see STAR 06 09.
N68-18351 HC$3.00 MF$0.65

SOLAR-CELL INTEGRAL COVER-GLASS DEVELOPMENT PROGRESS REPORT, 10 FEB. - 31 MAY 1967.
Texas Instruments, Inc., Dallas. Semiconductor-components Div.
31 May 67, 30p NASA-CR-93408, REPT.-03-67-51
Contract NAS5-10319

Descriptors: *Deposition, *Glass coatings, *Solar cells, *Sputtering, *Thin films, Environmental tests, Quartz, Radio frequencies, Silicon, Stress analysis, Thermal shock.

For abstract, see STAR 06 09.
N68-18451 HC$3.00 MF$0.65

SATELLITE POWER-CONDITIONING AND CONTROL - A SUMMARY OF DESIGN POSSIBILITIES.
European Space Technology Center, Noordwijk (Netherlands).
A. W. Preukschat. Oct 67, 21p ESRO-TM-54/ESTEC/
Coll- 21 P

Descriptors: *Current regulators, *Solar cells, *Spacecraft power supplies, *Voltage regulators, Auxiliary power sources, Bypasses, Electric batteries, Electric generators, Power supply circuits, Satellites, Solar generators, Systems engineering.

For abstract, see STAR 06 09.
N68-18466 HC$3.00 MF$0.65

ADVANCED VOLTAGE REGULATOR TECHNIQUES AS APPLIED TO MAXIMUM POWER POINT TRACKING SYSTEMS FOR THE NIMBUS METEOROLOGICAL SATELLITE FINAL REPORT, 16 JUN. 1965 - 10 OCT. 1967.
Radio Corp. of America, Princeton, N. J. Astro-electronics Div.
10 Oct 67, 158p NASA-CR-93413, AED-R-3221
Contract NAS5-3248

Descriptors: *Pulse duration modulation, *Spacecraft power supplies, *Voltage regulators, Circuits, Meteorological satellites, Models, Satellite tracking.

For abstract, see STAR 06 09.
N68-18503 HC$3.00 MF$0.65

DYNAMIC CHARACTERISTICS OF PARASITIC LOADING SPEED CONTROLLER FOR 10 KILOWATT BRAYTON CYCLE TURBOALTERNATOR.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
D. J. Droba, and R. L. Fischer. Mar 68, 18p
NASA-TM-X-1456

Descriptors: *Ac generators, *Brayton cycle, *Dynamic characteristics, *Speed control, *Static loads, *Turbogenerators, Energy levels, Input, Output, Performance, Reliability engineering.

For abstract, see STAR 06 09.
N68-18702 HC$3.00 MF$0.65

ADVANCED FUEL CELL CATALYSTS STATUS REPORT, 10 NOV. 1967 - 10 FEB. 1968.
Pennsylvania Research Associates, Inc., Philadelphia.
C. V. Bocciarelli. 10 Feb 68, 46p NASA-CR-93426, EC-SR-3
Contract NAS7-574

Descriptors: *Catalysts, *Fuel cells, *Surface properties, Crystal structure, Current distribution, Electrodes, Electrolysis, Hydrogen, Oxygen, Platinum black, Single crystals, Thin films, Work functions.

For abstract, see STAR 06 09.
N68-18719 HC$3.00 MF$0.65

ANALYSIS OF THE MAXIMUM PERFORMANCE OF A PARABOLOIDAL SOLAR COLLECTION SYSTEM FOR SPACE POWER.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
G. N. Kaykaty. Mar 68, 19p NASA-TN-D-4415
Contract 120-33-05-02-22

Descriptors: *Errors, *Parabolic reflectors, *Solar collectors, *Thermodynamic efficiency, Concentrators, Energy conversion, Positioning, Receivers, Rims, Solar energy, Surface defects, Temperature effects.

For abstract, see STAR 06 09.
N68-18998 HC$3.00 MF$0.65

CRITERIA FOR USE OF RANKINE-MHD SYSTEMS IN SPACE.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
L. D. Nichols. 1966, 24p NASA-TM-X-52191
Refs Conf- Presented At the Intern. Symp. on Magnetohydrodyn. Elec. Power Generation, Salzburg, Austria, 4-8 Jul. 1966

Descriptors: *Magnetohydrodynamic generators, *Rankine cycle, *Systems engineering, Ac generators, Heat radiators, Magnetic fields, Pressure distribution, Thermionic converters, Thermionic emission, Turbogenerators, Vapor pressure.

For abstract, see STAR 06 09.
N68-19019 HC$3.00 MF$0.65

FABRICATION FEASIBILITY STUDY OF A 30 WATT/POUND ROLL-UP SOLAR ARRAY QUARTERLY REPORT, 1 OCT. - 31 DEC. 1967.
Fairchild Hiller Corp., Germantown, Md. Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. Space and Electronics Systems Div.
H. G. King. 2 Feb 68, 192p NASA-CR-93595, REPT.-652-00102-QR
Contracts NAS7-100, JPL-951969
Prep- Prepared for Jpl

Descriptors: *Folding structures, *Solar cells, *Spacecraft power supplies, Arrays, Boron, Epoxy resins, Expandable structures, Fabrication, Graphite, Spacecraft structures, Specifications, Systems engineering.

For abstract, see STAR 06 09.
N68-19021 HC$3.00 MF$0.65

VOYAGER SPACECRAFT PHASE B, TASK D. VOLUME 4 - ENGINEERING TASKS. BOOK 1 - EFFECT OF CAPSULE RTG'S ON SPACECRAFT FINAL REPORT.

General Electric Co., Philadelphia, Pa. Missile and Space Div.
For primary bibliographic entry see Field 22B.
For abstract, see STAR 06 09.
N68-19099 HC$3.00 MF$0.65

DEVELOPMENT OF CATHODIC ELECTROCATALYSTS FOR USE IN LOW TEMPERATURE H2/O2 FUEL CELLS WITH AN ALKALINE ELECTROLYTE QUARTERLY REPORT, 1 OCT. - 31 DEC. 1967.
Tyco Labs., Inc., Waltham, Mass.
R. Cattabriga, J. Giner, J. Parry, and L. Swette.
31 Dec 67, 34p NASA-CR-93666, Q-10
Contract NASW-1233

Descriptors: *Electrocatalysts, *Electrolytes, *Hydrogen oxygen fuel cells, Electrodes, Mathematical models, Performance prediction, Performance tests, Test facilities.

For abstract, see STAR 06 09.
N68-19362 HC$3.00 MF$0.65

10C. Energy Storage

DEVELOPMENT OF MAGNESIUM WAFER CELLS.
Semiannual rept. 1 May-31 Oct 67,
Burgess Battery Co Freeport Ill
Lloyd W. Eaton. Feb 68, 30p
ECOM-02135-5
Contract DA-28-043-AMC-02135 (E)
See also AD-661 642.

Descriptors: (*Primary cells, *Magnesium), (*Dry cells, Magnesium), Failure (Electronics), Corrosion, Electrodes, Batteries + components, Thermal stability, Storage, Materials, Protective coverings.
Identifiers: *Magnesium wafer cells.

The principal failure of magnesium bromide batteries has been the degree of corrosion of the magnesium anode on the contact side that progresses under the cell wrap seal and increases the resistance of the contact or destroys the contact. It has been concluded that the presence of air is causing the anode to be attacked on the contact (non-reactive) side to an excessive degree and that the anode in a flat cell needs complete protection on the non-reactive side. Magnesium perchlorate cathode material seems to intensify the action on the non-reactive side of the anode and there is a strong suggestion that the rubber hydrochloride cell wrap is being degraded by the oxidizing nature of the perchlorate at 160F. causing leakage and the destruction of the batteries stored at 160F. (Author)
AD-666 790 HC$3.00 MF$0.65

RESEARCH INTO FUNDAMENTAL PHENOMENA ASSOCIATED WITH SPACECRAFT ELECTROCHEMICAL DEVICES - CALORIMETRY OF NICKEL-CADMIUM CELLS PROGRESS REPORT, 1 APR. - 30 JUN. 1967.
American Univ., Washington, D. C.
R. T. Foley, and G. D. Mitchell. 30 Jun 67, 20p
NASA-CR-93430, PR-4
Contract NAS5-10105

Descriptors: *Heat measurement, *Nickel cadmium batteries, *Spacecraft power supplies, Calibrating, Cooling, Electrochemical cells, Fabrication, Heat exchangers, Instruments, Pressure sensors, Sensitivity, Thermopiles.

For abstract, see STAR 06 09.
N68-18709 HC$3.00 MF$0.65

CHARACTERIZATION OF RECOMBINATION AND CONTROL ELECTRODES FOR SPACECRAFT NICKEL CADMIUM CELLS FINAL REPORT.
General Electric Co., Gainesville, Fla. Battery Business Section.
W. N. Carson, Jr., G. Rampel, and I. B. Weinstock. Jan 68, 111p NASA-CR-93427
Contract NAS5-10261

Descriptors: *Electric charge, *Electrodes, *Nickel cadmium batteries, *Oxygen recombination, Charging, Chemical auxiliary power units, Electric batteries, Electric potential, Spacecraft power supplies.

For abstract, see STAR 06 09.
N68-18826 HC$3.00 MF$0.65

RESEARCH ON THE POLARIZATION IN POROUS OXYGEN ELECTRODES QUARTERLY REPORT, 1 OCT. - 31 DEC. 1967.
Allmanna Svenska Elektriska A. B., Vasteras (Sweden). Chemistry Lab.
I. Edwardsson, and I. Lindholm. 24 Jan 68, 51p
NASA-CR-93486, QR-3
Contract NASW-1536

Descriptors: *Electrodes, *Electrolytic polarization, *Oxygen, Current distribution, Electrocatalysts, Electrochemical oxidation, Electron decay rate, Metal surfaces, Nickel, Palladium, Platinum, Porosity, Porous boundary layer control, Potassium hydroxides, Silver, Surface reactions, Temperature effects, Thin films.

For abstract, see STAR 06 09.
N68-18828 HC$3.00 MF$0.65

11. MATERIALS

11A. Adhesives and Seals

HIGH TEMPERATURE STABLE CARBORANE ADHESIVES QUARTERLY PROGRESS REPORT, 21 JUN. - 20 SEP. 1966.
General Precision, Inc., Little Falls, N. J. Aerospace Research Center.
R. Barnes. 15 Oct 66, 24p NASA-CR-65990, QPR-3
Contract NAS9-5527

Descriptors: *Adhesives, *Aerospace environments, *Carborane, *Epoxy resins, Alkenes, High temperature.

For abstract, see STAR 06 09.
N68-18504 HC$3.00 MF$0.65

11B. Ceramics, Refractories, and Glasses

MEASUREMENTS OF STRESS AND STRAIN ON CYLINDRICAL TEST SPECIMENS OF ROCK AND CONCRETE UNDER IMPACT LOADING.
Ohio River Div. Labs., Cincinnati.
For primary bibliographic entry see Field 20K.
AD-480 990 HC$3.00 MF$0.65

X-RAY ABSORPTION SPECTROSCOPY AT THE COPPER K EDGE. OPTIMIZED PROCEDURES FOR GLASS MATERIALS,
Owens-Illinois Technical Center Toledo Ohio
Charles G. Dodd, John T. Wilband, and Richard A. Moser. Feb 68, 9p
AFOSR-68-0497
Contract AF 49 (638)-1670
Availability: Published in Siemens Review v34 X-Ray and Electron Microscopy News, p1-7 1967.

Descriptors: (*Glass, *X-ray absorption analysis), X-ray spectroscopy, Absorption, Optimization, Copper, Copper compounds, Atomic energy levels, Resolution, Diffraction, Experimental data, Oxides.
Identifiers: Amorphous materials.

X-ray absorption spectroscopy is a particularly promising tool for characterizing amorphous materials such as glass. The problems that hinder this application are (1) difficulties in obtaining adequate spectral resolution and definition, (2) appropriate instrumental design and experimental procedures, and (3) satisfactory theoretical interpretation. This paper describes work directed to the solution of the first two problems. The data presented were obtained using samples of optimum thickness and a single-crystal spectrometer equipped with an incident x-ray beam monitor. Absorption edge spectral data have been collected for copper metal, copper oxides and a copper-oxide containing glass-ceramic model composition. The spectral definition of extended Kronig fine structure is significantly improved. In the case of copper metal the measured spectra compare favorably with published data taken with a two-crystal spectrometer. The data are used to illustrate applications to the characterization of materials and the estimation of interatomic distances in glasses. (Author)
AD-666 708 Not available from CFSTI.

A SURVEY OF POTENTIAL CERAMIC ARMOR MATERIALS.
Monograph series,
Army Materials and Mechanics Research Center Watertown Mass
Jacob J. Stiglich, Jr. Mar 68, 13p Rept no. AMMRC-MS-68-04

Descriptors: (*Armor, *Ceramic materials), Reviews, Borides, Carbides, Nitrides, Oxides, Silicides, Metalloid alloys, Intermetallic compounds, Cermets, Composite materials, Solid solutions, Density, Modulus of elasticity, Hardness, Abundance.

A list of materials having potential armor application is presented along with values of density, Young's modulus, and hardness for each material if such data is available. Some ideas for future research and development work in this field are presented to illustrate the directions in which it is believed that future improvements lie in the field of ceramic armor. (Author)
AD-666 766 HC$3.00 MF$0.65

ROOM TEMPERATURE STRENGTH OF PYROLYTIC GRAPHITE AS AFFECTED BY MICROSTRUCTURE AND BORON CONTENT.
Technical rept.,
Army Materials and Mechanics Research Center Watertown Mass
Samuel J. Acquaviva, and R. Nathan Katz. Feb 68, 19p Rept no. AMMRC-TR-68-04

Descriptors: (*Pyrolytic graphite, Mechanical properties), Flexural strength, Modulus of elasticity, Tensile properties, Compressive properties, Anisotropy, Microstructure, Nucleation, Additives, Boron.

The strengths of pyrolytic graphites possessing four varieties of microstructure ranging from coarse-coned singularly nucleated to fine-coned continuously nucleated were examined. The fine-coned structure gave substantially higher strengths. Boron-doped pyrolytic graphite with percentages of boron varying from 0.25 to 3.3% were evaluated in terms of their modulus and flexural strength. The higher boron content material (1 to 3.3% B) achieved strengths as much as fifty percent greater than the undoped material. (Author)
AD-666 767 HC$3.00 MF$0.65

INTERIOR COATING SYSTEMS FOR SURFACES IN CONTACT WITH PETROLEUM FUELS.
Technical manual.
Office of the Director of Defense Research and Engineering Washington D C
Mar 68, 54p

Group 11B — Ceramics, refractories, and glasses

Descriptors: (*Storage tanks, Coatings), (*Coatings, Handbooks), Petroleum, Fuels, Compatibility, Organic coatings, Specifications, Quality control, Standards.
Identifiers: Interior coatings, *Fuel-resistant coatings.

This manual is intended to be a technical reference and guide to the materials, application methods, inspection techniques and specifications that will yield the best internal coatings for surfaces of containers in contact with petroleum fuels. Its purpose is to serve as a tool that will help toward improved and uniform practices in the selection and application of the most appropriate coatings. Comments are included on coating surfaces of containers--from the 5-gallon can to the largest storage tank or tank vessel, both metal and nonmetal, whether used for storage or for handling military fuels.
AD-666 969 HC$3.00 MF$0.65

ON THE DEVELOPMENT OF TWO-PHASE STRUCTURE IN GLASSES WITH SPECIAL REFERENCE TO THE SYSTEM BaO-SiO2.
Interim technical rept.,
Harvard Univ Cambridge Mass Div of Engineering and Applied Physics
T. P. Seward, III, D. R. Uhlmann, and D. Turnbull. Jan 68, 66p Rept no. TR-15
Contract N00014-67-A-0298-0009

Descriptors: (*Glass, Phase studies), Barium compounds, Oxides, Silicon dioxide, Silicates, Films, Vapor plating, Microstructure, Separation, Crystallization.
Identifiers: Barium oxide.

The technique of vapor deposition was used to obtain homogeneous glass films of several BaO-SiO2 compositions in the region of the metastable miscibility gap. The films were electron beam heated in the electron microscope and the process of phase separation was observed. At low BaO contents, the separation was characterized by the appearance of discrete, amorphous, second-phase particles. For compositions near the center of the miscibility gap, the separation process resulted in two continuously interconnected phases similar to those found in the corresponding bulk glasses. In the thinnest of these films the process was observed to proceed by the coalescence of isolated particles into the interconnected second-phase submicrostructure. At high BaO contents, rapid crystallization of the films prevented study of the separation process. Two processes which could lead to the coalescence of discrete second-phase particles into an interconnected submicrostructure are discussed. It is suggested that coalescence may take place when either of these processes results in the particles approaching within some small distance of each other. The results indicate that observations of final phase-separated morphologies are inadequate for specifying the processes by which those morphologies arose. (Author)
AD-666 983 HC$3.00 MF$0.65

CERAMIC DIELECTRICS WITH RELATIVELY HIGH THERMAL CONDUCTIVITIES.
Revised ed.,
Brush Beryllium Co Elmore Ohio
Curtis O. Holladay, and Sam Divita. 1 Oct 66, 4p
Contract DA-28-043-AMC-01242 (E)
Revision of report dated 18 Jul 66.
Availability: Published in IEEE Transactions on Parts, Materials and Packaging, vPMP2 n4 p110-3 Dec 1966.

Descriptors: (*Waveguides, *Ceramic materials), (*Dielectrics, Preparation), Beryllium oxides, Rutile, Strontium compounds, Titanates, Perovskites, Doping, Electromagnetic properties, Microwave frequency, Thermal conductivity, Flexural strength.
Identifiers: Strontium titanate, Permitivity.

Ceramic dielectrics were prepared by dispersing a high dielectric constant phase in a beryllium oxide matrix. The dispersant phases were doped rutile (TiO2) and strontium and calcium titanate. The microwave dielectric constants varied from 10 to 23 as a function of the amount of dispersed phase. The room temperature thermal conductivity of the same mixture-compositions varied from 0.27 to 0.6 cal/ (cm.sec.deg C). Mixture equations proved inadequate to predict the dielectric constant and thermal conductivity with any significant degree of accuracy. Loss tangents were generally 0.0007, or lower, except for strontium titanate which undergoes a relaxation at microwave frequencies, thus the mixture-loss was raised to 0.0024. The ceramic mixtures sintered to densities typically higher than 97% of theoretical and yielded flexural strengths of the order of 38 000 lbf/sq in. These values compare favorably with those of single phase BeO ceramics. (Author)
AD-667 162 Not available from CFSTI.

ENGINEERING PROPERTIES OF CERAMICS. DATABOOK TO GUIDE MATERIALS SELECTION FOR STRUCTURAL APPLICATIONS.
Final rept. Mar 65-Jun 66,
Battelle Memorial Inst., Columbus, Ohio.
James F. Lynch, Clifford G. Ruderer, and Winston H. Duckworth. Jun 66, 660p
AFML-TR-66-52
Contract AF 33 (615)-2316

Descriptors: (*Ceramic materials, *Handbooks), (*Refractory materials, Handbooks), Composite materials, Borides, Carbides, Oxides, Sulfides, Silicides, Metalloids, Melting point, Intermetallic compounds, Aluminum compounds, Beryllium compounds, Nitrides, Physical properties, Thermal properties, Mechanical properties, Corrosion.

The Databook of engineering properties of ceramics supersedes the Materials Selection Handbook, issued in October, 1963, as RTD-TDR-63-4102 and its two supplements dated May 1964, and April 1965. The materials covered are principally refractory inorganic compounds in the form of monophase crystalline ceramics. Exceptions are the coverage of selected refractory composite materials and intermetallic compounds, as well as metalloid elements of boron, silicon, and germanium. Excluded are glasses, carbons, graphites, and compounds melting below about 2000 F (1200 C). Properties given are those pertinent to structural engineering. The data are in a format designed to permit comparison and selection of materials as well as to provide details on each specific material. Discussions of factors affecting property values and structural application of brittle materials also are included.
AD-803 765 HC$3.00 MF$0.65

INVESTIGATION OF REFRACTORY DIELECTRICS FOR INTEGRATED CIRCUITS.
International Business Machines Corp., Cambridge, Mass.
For primary bibliographic entry see Field 20L.
For abstract, see STAR 06 09.
N68-18849 HC$3.00 MF$0.65

STRENGTH EFFECT OF CUTTING OFF TENSION BARS IN CONCRETE BEAMS.
Research rept.,
Texas Univ., Austin. Center for Highway Research.
Phil M. Ferguson, and Syed I. Husain. Jun 67, 44p
RR-80-1F
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Reinforced concrete, *Beams (Structural)), Reinforcing materials, Structural properties, Experimental design, Flexural strength, Tensile properties, Test methods, Statistical data, Shear stresses, Failure (Mechanics), Rods, Statistical analysis.
Identifiers: Prestressed concrete, Stirrups (Structural).

Sixty-four concrete beams reinforced with no. 8 or no. 11 bars (largely A432) were tested as simple beams. Most of these had bars cut off at the minimum point for moment or at 12D or 15D beyond such points. Some, for comparison, contained full length bars or bars bent up. The majority of the beams with bars cut off were designed to be balanced at ultimate in flexural strength, shear strength, and bond strength. The addition of extra stirrups improved the weak beams, but stirrup effectiveness in replacing strength was only about half the normal rfy evaluation. Design recommendations based on the use of the ACI Building Code allowables for bond and shear stresses are made for beams with bars cut off. Designs should be based on a typical 30 percent loss of shear strength where bars cut off, a 20 percent loss where heavy stirrups are already provided (rfy greater than or equal to 130 psi), and a 10 percent loss for slabs 12 inches or less in thickness. If remedial stirrups are used, they should provide an rfy adequate to care for twice the indicated shear deficiency and in no case less than 100 psi. (BPR Abstract)
PB-177 700 HC$3.00 MF$0.65

THE DAMPING PROPERTIES OF PLAIN CONCRETE: EFFECT OF COMPOSITION AND RELATIONS WITH ELASTICITY AND STRENGTH,
Road Research Lab., Crowthorne (England).
R. Jones, and G. B. Welch. 1967, 19p RRL-LR111

Descriptors: (*Concrete, Structural properties), Physical properties, Bonding, Damping, Modulus of elasticity, Strength, Compressive properties, Sampling, Model tests, Great Britain.

The report describes experiments to measure the vibrational damping coefficient, dynamic Young's modulus of elasticity, flexural strength and compressive strength of three categories of plain concrete and their corresponding sand-cement mortars. The concretes comprised high strength mixes (mix proportions 1:1:2.5/0.35 by weight), pavement quality mixes (1:2.1:4.1/0.5 to 1:2.1:6.0/0.5) and lean concretes (1:6:11/1.0). Each mix was repeated with three different types of coarse aggregate: Bridport gravel, Chertsey gravel and Charnwood crushed granite, of 3/4-in. maximum size in the high strength and pavement quality mixes, and of 1 1/2-in. maximum size in the lean concrete and in additional pavement quality mixes. The damping was higher in the sand-cement mortars of each type of mix than in the corresponding concretes. Damping was greater in the lean concretes than in the pavement quality or high strength mixes, and also tended to be slightly higher in concretes containing crushed granite than in the corresponding mixes containing the natural gravels. The results support the view that damping in concrete arises mainly from the presence of water voids in the cement paste and, to a lesser extent, from the boundaries between the cement paste and the fine and coarse aggregate particles. An analysis of the results suggests that there is unlikely to be a unique relation, of the type found by other workers in a more limited investigation, between damping, dynamic Young's modulus of elasticity and either compressive or flexural strength. (Author)
PB-177 719 HC$3.00 MF$0.65

THE EFFECT OF FLUX-OIL AND TRINIDAD LAKE ASPHALT CONTENT ON THE PHOTO-OXIDATION OF ASPHALTIC CEMENTS,
Road Research Lab., Crowthorne (England).
For primary bibliographic entry see Field 11G.
PB-177 722 HC$3.00 MF$0.65

11C. Coatings, Colorants, and Finishes

ELECTROPLATED NICKEL RAIN EROSION RESISTANT COATING.
Technical rept. Jul 65-Sep 66,
Air Force Materials Lab Wright-Patterson AFB Ohio

James H. Weaver. Jan 68, 32p Rept no. AFML-TR-67-356

Descriptors: (*Laminated plastics, Metal coatings), (*Protective treatments, Leading edge), Electroplating, Nickel, Erosion, Rain, Wear resistance, Environmental tests, Plating, Electroforming.

The problem of protection of plastic components of advanced aircraft and missile weapon systems from the damaging effect of rain impingement at high speeds is severe and will become more severe in the future. Metal coating of plastic laminates is particularly applicable to plastic structural members such as wing leading edge of aircraft, helicopter rotor blades, and turbine engine compressor blades. Epoxy, polyester, and polybenzimidazole laminates were electroplated with a minimum of 12 mil of nickel and exposed to a rain environment at subsonic speeds. The plated epoxy endured 160 minutes, the plated polyester 180 minutes, and the plated polybenzimidazole 473 minutes with no visible evidence of erosion. The latter represents a 40-fold increase in resistance over specification neoprene coatings. Supersonic rocket sled test runs at Mach 1.5 and 2.0 showed no evidence of erosion. The 60-degree angle exposure at Mach 2.5 showed mild damage. Electroformed nickel patches were bonded to stabilizer edges of an F-100 airplane which subsequently made a total of 163 penetrations into rain and hail storms for a total time of 440 minutes with no indication of erosion of the electroformed nickel. Substrate preparation and nickel thickness were found to be the most important criteria for obtaining good rain erosion resistant coatings. Mechanical interlocking achieved by sandblasting appears to be the most efficient method to obtain adhesion to the inert surface. A minimum thickness of 12 mil of the nickel coating on the laminates is recommended to obtain protection from rain erosion. (Author)
AD-666 674 HC$3.00 MF$0.65

FABRICATION AND PROPERTIES OF CHEMICAL VAPOR DEPOSITED NB LAYERS ON AL2 03 BODIES FOR THERMIONIC APPLICATION.
European Atomic Energy Community, Ispra (Italy).
For primary bibliographic entry see Field 10A.
For abstract, see STAR 06 09.
N68-18962 HC$3.00 MF$0.65

INTENSIVE BITUMINOUS PAVING TRIAL ON THE WARWICK BY-PASS,
Road Research Lab., Crowthorne (England).
For primary bibliographic entry see Field 13B.
PB-177 716 HC$3.00 MF$0.65

11D. Composite Materials

NONCONSERVATIVE BEHAVIOR OF COMPOSITE MATERIALS.
Technical rept. Jan 67-Jan 68,
Philco-Ford Corp Newport Beach Calif Aeronutronic Div
Joseph M. Bloom. Feb 68, 74p Rept no. U-4325 AFML-TR-68-10
Contract AF 33 (615)-5198

Descriptors: (*Composite materials, Mechanical properties), (*Reinforced plastics, Mechanical properties), Reinforcing materials, Filaments, Stresses, Poisson's ratio, Shear stresses, Boron, Epoxy plastics, Viscoelasticity, Loading (Mechanics).
Identifiers: Unidirectional composites.

The axial loading solution for anisotropic filaments is an extension of the isotropic filaments solution included in AD-654 056. Numerical results are presented indicating that stresses in the transverse plane are lower than for isotropic filaments and that the simple 'rule of mixtures' approximations for predicting composite axial stiffness and major Poisson's ratio are valid for anisotropic as well as isotropic filament composites. Experimental studies included the determination of longitudinal shear strength and stiffness properties of unidirectional boron-epoxy composites. The solid rod torsion test as well as the plate twist test were used. Tension-zero-tension cyclic fatigue data for 0 deg unidirectional S glass-epoxy composites are presented along with additional data concerning the influence of surface grinding on the mechanical properties of 90 deg unidirectional specimens. An analytical investigation of the linear viscoelastic behavior of composite materials is made by the solution of the problem of a single elastic inclusion in an infinite viscoelastic matrix under transverse loading. Experimental data presented in the literature is evaluated and used in various approximate viscoelastic models for the epoxy resin matrix. Insights into the behavior of the periodic array of inclusions are drawn from the single inclusion solution with limitations noted. (Author)
AD-666 675 HC$3.00 MF$0.65

KINETICS OF NYLON AND PHENOLIC PYROLYSIS.
Lockheed Missiles and Space Co Sunnyvale Calif
For primary bibliographic entry see Field 11I.
AD-667 181 HC$3.00 MF$0.65

OXIDE DEFORMATION AND FIBER REINFORCEMENT IN A TUNGSTEN METAL OXIDE COMPOSITE.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
C. P. Blankenship. Mar 68, 41p NASA-TN-D-4475
Contract 129-03-14-03-22

Descriptors: *Reinforcing fibers, *Tungsten, *Uranium oxides, *Zirconium oxides, Composite materials, Extruding, Powder (particles), Powder metallurgy, Refractory metals, Strain rate, Temperature distribution.

For abstract, see STAR 06 09.
N68-18610 HC$3.00 MF$0.65

FABRICATION AND CHARACTERIZATION OF METAL CARBIDE-GRAPHITE COMPOSITES.
IIT Research Inst., Chicago, Ill.
Y. Harada, and G. A. Rubin. 9 May 66, 26p NASA-CR-75184
Contract NASR-65
Conf- Presented At the 68th Ann. Meeting of the Am. Ceram. Soc., Washington, 9 May 1966

Descriptors: *Carbides, *Composite materials, *Graphite, *Hot pressing, *Refractory metals, *Thermal shock, Hardening (materials), Hardness, Heat treatment, Metallography, Metallurgy, Microstructure, Phase transformations, Temperature effects.

For abstract, see STAR 06 09.
N68-19220 HC$3.00 MF$0.65

THE POTENTIALS OF COMPOSITE STRUCTURES IN THE DESIGN OF AIRCRAFT.
Advisory Group for Aerospace Research and Development, Paris (France).
1967, 74p AGARD-10
Conf- Presented At the 22d Agard Struct. and Mater. Panel Meeting, Delft, Holland, 18-22 Apr. 1966

Descriptors: *Aircraft structures, *Composite materials, *Composite structures, *Reinforcing fibers, Asbestos, Axial loads, Box beams, Glass fibers, Sandwich structures, Stiffening, Structural analysis, Wings.

For abstract, see STAR 06 09.
N68-19228 HC$3.00 MF$0.65

ANALYSIS OF VOLUME CHANGE TEST OF PORTLAND CEMENT MORTAR.
Research rept.,
California State Div. of Highways. Materials and Research Dept.
George B. Sherman, and Robert O. Watkins. Nov 67, 7p M/R-631133-8
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Concrete, Contraction), (*Analysis of variance, Volume), Analysis of variance, Sampling, Test methods, Standards, Statistical analysis, Specifications, Drying, Population (Mathematics), California, Stability.
Identifiers: Expansion.

The report covers a study of the expansion in water -- contraction in air test for Type II Portland cement mortar. The data collection from tests performed in the Materials and Research Laboratory from June 1963 to August 1966. Test Method No. 527 was used. The study indicates no need for changes in the current California specifications. (BPR Abstract)
PB-177 536 HC$3.00 MF$0.65

INVESTIGATION OF THE BEHAVIOR OF CONCRETE UNDER TENSILE STRAIN GRADIENTS,
Florida Univ., Gainesville. Engineering and Industrial Experiment Station.
For primary bibliographic entry see Field 13M.
PB-177 707 HC$3.00 MF$0.65

MINERAL WEAR IN RELATION TO PAVEMENT SLIPPERINESS,
Pennsylvania State Univ., University Park. Dept. of Mechanical Engineering.
For primary bibliographic entry see Field 13B.
PB-177 754 HC$3.00 MF$0.65

11E. Fibers and Textiles

DEVELOPMENT OF A MULTIDIRECTIONAL-STRETCH SPACER FABRIC.
Final rept. 30 Jun-29 Dec 67,
Uniroyal Inc Wayne N J Research Center
M. W. Olson, A. S. Glowacki, and R. A. Fowkes. Dec 67, 33p
USA-NLABS-TR-68-34-CM, C/OM-39
Contract DA-19-129-AMC-1069 (N)

Descriptors: (*Textiles, *Manufacturing methods), Protective clothing, Military requirements, Fibers, Configuration, Materials, Polyester plastics, Design, Test methods, Weight, Stresses, Thermal radiation, Heat-resistant plastics, Specifications, Nylon, Synthetic rubber, Halocarbon plastics.
Identifiers: *Multidirectional-stretch fabrics, Spacer fabrics, *Monocoil fabrics.

An investigation was conducted to develop a 3-dimensional spacer fabric for use in the air distribution system of the experimental thermalibrium protective clothing system designed by the U. S. Army Natick Laboratories. A multidirectional-stretch spacer fabric known as 'monocoil' made by interlocking coiled monofilaments in a square woven fabric-like configuration, was selected as the candidate system. A variety of materials were studied. Based on analysis of available monofilaments, polyester was chosen as the material to be used in the construction of this 3-dimensional fabric. Numerous monocoil designs were fabricated and tested for air flow, compression, weight, and stretch characteristics. A construction which met specifications was selected for quantity production. Two-hundred linear yards of experimental spacer fabric 42-48 inches wide were manufactured. During development, it was found necessary to apply a protective or restraining cover to control stretch and enable handling of the spacer fabric. Cover materials included high-stretch power net, Jersey-knit Nomex fabric, and neoprene sheeting. (Author)
AD-666 804 HC$3.00 MF$0.65

JOURNAL PUBLICATIONS OF INTEREST TO THE TEXTILE INDUSTRY: 1ST EDITION,
Massachusetts Inst. of Tech., Cambridge. Fibers and Polymers Div.
P. Jacobs, and S. Backer. 1967, 185p MIT-FP-173-67
Contracts NBS-CST-164, NBS-CST-1170

Descriptors: (*Textiles, Bibliographies), Patents, Paper, Agriculture, Chemistry, Physics, Mechanical engineering, Glues, Commerce, Power supplies, Physiology, Electronics, Animals, Cotton, Silk, Woolen textiles, Polymers, Dyes, Coal tar, Fibers (Natural), Fibers (Synthetic), Water, Wastes (Industrial), Rubber, Management planning.

The index gives information about journals and periodicals of interest to workers in many areas of the textile industry. The journals included cover many diverse fields, such as agriculture, chemistry, physics, mechanical engineering, and others. (Author)
PB-177 630 HC$3.00 MF$0.65

11F. Metallurgy and Metallography

THE EFFECT OF VACUUM ON SURFACE DAMAGE IN FATIGUE.
Final scientific rept.,
Texas Univ Austin Engineering Mechanics Research Lab
M. A. Wilkov, and B. Applewhite. Dec 67, 29p
Rept no. EMRL-RM-1039
AFOSR-67-2399
Grant AF-AFOSR-560-66

Descriptors: (*Aluminum, Fatigue (Mechanics)), (*Fatigue (Mechanics), Vacuum), Metallurgy, Surface properties, Dislocations, Electron microscopy, Nucleation, Stresses, Cracks, Gold.
Identifiers: Morphology (Metallurgy).

The environment at the surface is known to have a marked effect on the fatigue behavior of metals. In spite of considerable work on the relation between fatigue and environment almost nothing is known with certainty about the surface morphology and surface condition near the damage zones. The changes in both the surface topography and the dislocation structure, produced during fatiguing aluminum crystals in vacuum were investigated using electron microscopy and surface nucleation. It was found that the intrusions formed faster during fatigue in vacuum than in air, however, the width of the damage zone was reduced. The observation of enhanced nucleation on the slip lines in both specimens fatigued in vacuum exposed to air and then deposited and specimen fatigued in vacuum and deposited immediately indicated that the biggest difference in the surface damage was morphology rather than the condition of the oxide layer. (Author)
AD-666 678 HC$3.00 MF$0.65

INDEX OF TEMPER DESIGNATIONS OF ALLOYS,
Battelle Memorial Inst Columbus Ohio Defense Metals Information Center
W. D. Penniman. 1 Feb 68, 15p Rept no. DMIC Memo-233
Contract F33615-68-C-1325
See also DMIC Memo-232, AD-666 682.

Descriptors: (*Alloys, Tempering), (*Tempering, Indexes), Heat treatment, Aluminum alloys, Magnesium alloys, Iron alloys, Copper alloys, Material forming, Cold working, Classification.

The memorandum presents the definitions of temper designations. It is organized into three parts: (1) temper designation (alphanumeric), (2) temper, by metallurgical term, (3) tempers by base material. This memorandum, in conjunction with Memorandum 232, 'Designations of Alloys for the Aerospace Industry' provide a ready reference for any given combination of alloy and temper designations. (Author)
AD-666 681 HC$3.00 MF$0.65

DESIGNATIONS OF ALLOYS FOR THE AEROSPACE INDUSTRY (REVISED),
Battelle Memorial Inst Columbus Ohio Defense Metals Information Center
W. D. Penniman. 1 Feb 68, 58p Rept no. DMIC Memo-232-Rev.
Contract F33615-68-C-1325

Descriptors: (*Alloys, Indexes), Classification, Specifications, Aluminum, Beryllium, Chromium, Cobalt, Niobium, Iron, Magnesium, Molybdenum, Nickel, Steel, Tantalum, Titanium, Tungsten, Vanadium, Zirconium, Chemical analysis.

This document presents a computer-generated listing of principal alloys of interest in defense work. Included in the listing are alloy designations, specifications, and nominal compositions. Because the report is machine generated, it is intended to be updated frequently in order to keep up with new alloys and specifications. This Memorandum updates DMIC Memorandum 223, which was published April 12, 1967. (Author)
AD-666 682 HC$3.00 MF$0.65

SHEET TENSILE PROPERTIES OF TITANIUM ALLOYS AS AFFECTED BY TEXTURE.
Technical rept.,
Army Materials and Mechanics Research Center Watertown Mass
Anthone Zarkades, and Frank R. Larson. Jan 68, 30p Rept no. AMMRC-TR-68-03

Descriptors: (*Titanium alloys, Metallography), Microstructure, Anisotropy, Tensile properties, Poissons ratio, Sheets, Alignment, Grain structures (Metallurgy), Yield point.

A study was carried out on the effect of specimen orientation on the sheet tensile properties of several titanium alloys. For these alloys, chemical analysis, microstructure, X-ray pole figures, and sheet tensile properties were determined at 10-degree increments from the rolling to the transverse direction. In addition to the conventional yield strength, tensile strength, and elongation values, strain gages were used to determine Young's modulus and Poisson's ratio. A study of plastic anisotropy was also made. It is shown that several types of textures exist in these alloys and the characteristics of the mechanical properties are anisotropic and related to the texture type. A simple approximation of the anisotropic behavior patterns can be understood by relating these patterns to single-crystal properties. (Author)
AD-666 765 HC$3.00 MF$0.65

NEWS OF INSTITUTIONS OF HIGHER LEARNING. NONFERROUS METALLURGY, NO. 4, 1964.
Foreign Technology Div Wright-Patterson AFB Ohio
29 May 67, 245p Rept no. FTD-MT-65-20
Edited machine trans. of Izvestiya Vysshikh Uchebnykh Zavedenii. Tsvetnaya Metallurgiya (USSR) n4 p1-176 1964.

Descriptors: (*Metallurgy, USSR), Alloys, Chemical reactions, Chemical analysis, Crystallography, Electrical properties, Mining engineering, Minerals, Metals, Refining (Metallurgy), Soldering, Solutions, Thermodynamics, Ultrasonic properties, Ventilation.
Identifiers: Translations, Non-ferrous metallurgy.

The document contains 29 articles on USSR scientific research in fields relating to non-ferrous metallurgy, including physical and chemical properties and reactions.
AD-666 896 HC$3.00 MF$0.65

CALCULATION OF REGULAR SOLUTION PHASE DIAGRAMS FOR TITANIUM BASE BINARY SYSTEMS.
Technical rept.,
Manlabs Inc Cambridge Mass
Larry Kaufman, and Harold Bernstein. Apr 68, 20p Rept no. TR-14
Contract Nonr-2600 (00)
Prepared for presentation International Conference on Titanium, London (England), 21-24 May 68.

Descriptors: (*Titanium alloys, Phase diagrams), Numerical analysis, Thermodynamics, Heat of formation, Transition elements, Aluminum alloys, Intermetallic compounds, Crystal structure, Stability.
Identifiers: Binary systems (Metallurgy).

Previously developed computer techniques for calculating phase equilibria between regular solution phases and line compound-regular solution equilibria have been employed to compute binary phase diagrams for twenty titanium base systems including most of the transition metals and aluminum. Comparison with experimentally observed diagrams yields satisfactory agreement. The description includes the activity of each component as well as the heat of formation of compound phases. Extension of this method to ternary and higher order systems should offer substantial advantages in application and development of advanced alloys and composite materials. (Author)
AD-666 966 HC$3.00 MF$0.65

MAGNETIC TRANSITION METAL. RARE EARTH ALLOYS.
Final rept.,
Technische Hochschule Vienna (Austria) Institut Fuer Angewandte Physik
Franz Lihl. 27 Oct 67, 36p
Contract AF 61 (052)-942

Descriptors: (*Rare earth compounds, *Intermetallic compounds), Yttrium compounds, Cobalt alloys, Mercury alloys, Magnets, Powder metals, Neodymium alloys, Manganese alloys, Phase diagrams, Magnetism, Terbium compounds, Crystal structure, Ytterbium, Alloys, Transition elements.

The present state of the preparation of YCo5 and other RECo5 compounds by means of the amalgam process is reviewed. These compounds are interesting for powder permanent magnets. By an ultrasonic treatment of Y-Co-amalgam, followed by a heat treatment up to 1200C, finely divided YCo5 particles can be obtained, which seem to be well suited for permanent magnets. The system Nd-Mn has been investigated by X-ray diffraction, X-ray fluorescence DTA and micrographs. The intermetallic compounds Nd6Mn23 and NdMn12 are present. A schematic phase diagram is presented. Magnetic measurements on these compounds are given. Nd6Mn23 is ferromagnetic, NdMn12 seems to be antiferromagnetic at low temperatures. The system Tb-Mn has also been investigated and a schematic phase diagram is given. The compounds TbMn2, Tb6Mn23 and TbMn12 are present. Their crystal structure and lattice spacings are given. The phase diagrams of Tb-Hg and Yb-Hg have been investigated by differential thermal analysis. The schematic phase diagrams are presented. These diagrams are the basis for investigations of Tb- and Yb-alloys by means of the amalgam process. (Author)
AD-666 993 HC$3.00 MF$0.65

THE MECHANICS OF REPEATED DISCONTINUOUS YIELDING OF METALS.
Technion - Israel Inst of Tech Haifa
For primary bibliographic entry see Field 20K.
AD-667 128 Not available from CFSTI

INDUSTRIAL METHOD OF X-RAY FLUORESCENCE ANALYSIS OF HIGH-STRENGTH STEELS.

Army Tank-Automotive Center, Warren, Mich. Components Research and Development Labs.
For primary bibliographic entry see Field 7D.
AD-819 164 HC$3.00 MF$0.65

HIGH TEMPERATURE DEFORMATION OF DISPERSION STRENGTHENED NICKEL ALLOYS. 1 - THE INFLUENCE OF INITIAL STRUCTURE ON TENSILE AND CREEP DEFORMATION OF TD NICKEL. 2 - THE EFFECT OF MATRIX STACKING FAULT ENERGY ON CREEP OF NI-CR- TH O2 ALLOYS FINAL REPORT, 9 FEB. 1967 - 9 FEB. 1968.
Battelle Memorial Inst., Columbus, Ohio.
A. H. Clauer, and B. A. Wilcox. 29 Feb 68, 63p NASA-CR-72367
Contract NAS3-9413

Descriptors: *Creep tests, *Heat resistant alloys, *Mechanical properties, *Nickel alloys, *Plastic deformation, Chromium alloys, High temperature research, Recrystallization, Structural analysis, Thorium oxides.

For abstract, see STAR 06 09.
N68-18533 HC$3.00 MF$0.65

RESEARCH ON MECHANISMS OF ALLOY STRENGTHENING 1 - ALLOY STRENGTHENING BY FINE OXIDE PARTICLE DISPERSION. 2 - THE SPLAT COOLING PROCESS FOR ALLOY DEVELOPMENT SEMIANNUAL REPORT.
Massachusetts Inst. of Tech., Cambridge. Dept. of Metallurgy and Materials Science.
N. J. Grant. Dec 67, 29p NASA-CR-93409
Grant NSG-117-61
Descriptors: *Beryllium oxides, *Dispersions, *Fracture strength, *Iron, *Tensile deformation, Aluminum compounds, Copper alloys, Fractures (materials), Structural stability.

For abstract, see STAR 06 09.
N68-18549 HC$3.00 MF$0.65

STUDY OF WELDED JOINTS ON VERY THICK STEEL PLATES SPECIAL REPORT NO. 2.
Institut de Soudure, Paris (France).
15 Sep 67, 48p EURAEC-1927, EUR-3754
Contract EURATOM-007-64-TEEF/RD/

Descriptors: *Metal plates, *Steel structures, *Welded joints, Charpy impact test, Cooling, Impact strength, Thermal cycling tests.

For abstract, see STAR 06 09.
N68-18564 HC$3.00 MF$0.65

STATISTICAL AND METALLOGRAPHIC ASPECTS OF FATIGUE FAILURE MECHANISMS IN METALS.
Toronto Univ. (Ontario). Inst. for Aerospace Studies.
R. Ravindran. Feb 68, 84p NASA-CR-66578, UTIAS-TN-123
Contract NGR-52-026-008
Spon- Sponsored in Part By Nrc of Can.

Descriptors: *Copper alloys, *Failure, *Fatigue (materials), *Metallography, *Statistical analysis, S-n diagrams, Weibull density functions, X ray analysis.

For abstract, see STAR 06 09.
N68-18735 HC$3.00 MF$0.65

A METHOD FOR CORRELATING ELEVATED TEMPERATURE FATIGUE DATA FINAL REPORT, FEB. 1961 - FEB. 1962.
Alabama Univ., University. Bureau of Engineering Research.
R. M. Hollub. Aug 62, 152p NASA-CR-61631
Contract NAS8-1517

Descriptors: *Alloys, *Mathematical models, *Metal fatigue, *Temperature effects, Bibliographies, Correlation coefficients, High temperature research.

For abstract, see STAR 06 09.
N68-18766 HC$3.00 MF$0.65

APPROXIMATE CALCULATION OF THE SURFACE TENSION OF METALS.
Priblizhennyy Raschet Poverkhnostnogo Natyazheniya Metallov
Aztec School of Languages, Inc., Acton, Mass.
S. N. Zadumkin. Mar 68, 7p NASA-TT-F-11552
Contract NASW-1692
Coll- 7 P Refs Tran- Transl. Into English From Dokl. Akad. Nauk Sssr, V. 112, No. 3, 1957 P 453-456

Descriptors: *Free electrons, *Heat of vaporization, *Interfacial tension, *Surface properties, Anions, Approximation, Cations, Ionization potentials, Literature, Mathematical models, Tables (data), Work functions.

For abstract, see STAR 06 09.
N68-18818 HC$3.00 MF$0.65

USE OF SURFACE REPLICATION, EXTRACTION REPLICATION, AND THIN-FILM ELECTRON MICROSCOPY IN THE STUDY OF DISPERSION-STRENGTHENED MATERIALS.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
B. C. Buzek, and C. A. Hoffman. Mar 68, 25p NASA-TN-D-4461
Contract 129-03-01-05-22

Descriptors: *Electron microscopes, *Microstructure, *Precipitation hardening, *Replicas, *Thin films, Aluminum, Aluminum oxides, Dispersions, Metallography, Nickel, Thorium oxides.

For abstract, see STAR 06 09.
N68-18999 HC$3.00 MF$0.65

SHAPING OF PRECIPITATION-HARDENING STAINLESS STEELS BY CASTING AND POWDER-METALLURGY.
National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
For primary bibliographic entry see Field 13H.
For abstract, see STAR 06 09.
N68-19307 HC$3.00 MF$0.65

SURFACE TREATMENTS FOR PRECIPITATION-HARDENING STAINLESS STEELS.
National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
For primary bibliographic entry see Field 13H.
For abstract, see STAR 06 09.
N68-19343 HC$3.00 MF$0.65

11G. Miscellaneous Materials

MECHANISMS OF ENERGY TRANSFER IN DIELECTRICS.
New York Univ N Y Radiation and Solid State Lab
For primary bibliographic entry see Field 20C.
AD-666 775 HC$3.00 MF$0.65

ENGINEERING PROPERTIES OF CERAMICS. DATABOOK TO GUIDE MATERIALS SELECTION FOR STRUCTURAL APPLICATIONS.
Battelle Memorial Inst., Columbus, Ohio.
For primary bibliographic entry see Field 11B.
AD-803 765 HC$3.00 MF$0.65

RAIN EROSION AND ASSOCIATED PHENOMENA.
Federal Ministry for Defence, Bonn (West Germany). Royal Aircraft Establishment, Farnborough (England).
Aug 67, 472p
Conf- Proc. of the 2nd Symp. Held Meersburg, Ger., 16-18 Aug. 1967 Prep- Prepared Jointly With Federal Min. for Defence

Descriptors: *Aircraft structures, *Conferences, *Drop size, *Impact tests, *Protective coatings, *Rain impact damage, *Raindrops, *Solids, *Supersonic speeds, *Surface reactions, *Water erosion, Ceramics, Cloud seeding, Electroplating, Flight hazards, Hydrogeology, Measuring instruments, Metals, Plastics, Rain gages, Rainstorms, Steels, Supersonic aircraft, Wind effects.

For abstract, see STAR 06 09.
N68-19401 HC$3.00 MF$0.65

THE EFFECT OF FLUX-OIL AND TRINIDAD LAKE ASPHALT CONTENT ON THE PHOTO-OXIDATION OF ASPHALTIC CEMENTS.
Road Research Lab., Crowthorne (England).
C. F. Shields. 1967, 13p RRL-LR120

Descriptors: (*Asphalt, Oxidation), (*Cements, Asphalt), Pavements, Binders, Viscosity, Physical properties, Tables, Great Britain, Fuel oils, Surface properties, Solubility, Test methods, Petroleum.
Identifiers: Asphaltic cements.

The Note gives the results of an investigation into the effect of flux-oil and/or Trinidad Lake Asphalt content on the photo-oxidation of asphaltic cements. The investigation showed that: (a) a bitumen, 'cut-back' to a particular viscosity with flux-oil, developed the same surface texture and produced the same amount of water-soluble material as a straight-run bitumen of the same viscosity. (b) the surface texture developed by blends of Trinidad Lake Asphalt and petroleum bitumen is influenced by the percentage of Trinidad Lake Asphalt in the blend and the sources of the crude oil from which the bitumen was produced. (Author)
PB-177 722 HC$3.00 MF$0.65

11H. Oils, Lubricants, and Hydraulic Fluids

DEVELOPMENT OF LUBRICANT SCREENING TESTS AND EVALUATION OF LUBRICANTS FOR GAS TURBINE ENGINES FOR COMMERCIAL SUPERSONIC TRANSPORT.
Progress rept. no. 1.
Southwest Research Inst., San Antonio, Tex.
B. B. Baber, J. P. Cuellar, P. M. Ku, C. W. Lawler, and H. E. Staph. 1 Aug 62, 94p SWRI-RS-357
Contract AF 33 (657)-9248

Descriptors: (*Airplane engine oils, Jet transport planes), (*Jet transport planes, Lubricants), Supersonic planes, Gas turbines, Lubrication, Gears, Loading (Mechanics), Ball bearings, Fatigue (Mechanics), Oxidation, Corrosion, High-temperature research, Test methods, Test equipment.

During the period 1 May-31 July 1962 the effort was directed mainly toward three areas: gear load-carrying capacity bearing fatigue, and lubricant oxidation-corrosion. In the gear load-carrying capacity phase, considerable dynamic calibration of the test equipment and exploratory testing of lubricants made at temperatures up to 500 F. The bearing fatigue phase confined to design studies on a 3-ball/cone fatigue tester with a temperature capability of 800 F. The lubricant oxidation-corrosion phase encompassed further work on a 425 F oxidation-corrosion test procedure previously developed, design and construction of an oxidation-corrosion test apparatus with a temperature capability of 800 F, and exploratory testing of lubricants at 500 F. (Author)
AD-467 236 HC$3.00 MF$0.65

POLYMER SYNTHESIS: A SURVEY OF GOVERNMENT CONTRACTS SINCE 1960,
Plastics Technical Evaluation Center Dover N J
For primary bibliographic entry see Field 7C.
AD-666 758 HC$3.00 MF$0.65

AN ANALYSIS OF THE EFFECT OF A POLYMER ADDITIVE ON TURBULENT WALL FRICTION AND PRESSURE FLUCTUATIONS,
Navy Underwater Sound Lab New London Conn
For primary bibliographic entry see Field 20D.
AD-666 818 HC$3.00 MF$0.65

EVALUATION OF LUBRICANTS FOR HIGH-SPEED HIGH-TEMPERATURE APPLICATIONS SUMMARY REPORT.
Battelle Memorial Inst., Columbus, Ohio.
C. M. Allen, J. C. Bell, J. W. Kannel, and R. R. Riopelle. Nov 67, 82p NASA-CR-72346
Contract NAS3-7270
Seri- Its Sum. Rept. No. 1

Descriptors: *Disks (shapes), *High temperature lubricants, *Lubrication, Bearings, Dielectrics, Evaluation, High temperature fluids, Performance tests, Sliding, Supersonic transports, Thickness, X ray analysis.

For abstract, see STAR 06 09.
N68-18993 HC$3.00 MF$0.65

11I. Plastics

TIME-DEPENDENCE OF CRYSTAL ORIENTATION IN CRYSTALLINE POLYMERS.
Massachusetts Univ Amherst Polymer Research Inst
For primary bibliographic entry see Field 7D.
AD-666 622 HC$3.00 MF$0.65

THE EFFECT OF BIREFRINGENCE ON LOW ANGLE LIGHT SCATTERING PATTERNS FROM ORIENTED POLYMER FILMS.
Massachusetts Univ Amherst Polymer Research Inst
For primary bibliographic entry see Field 7D.
AD-666 624 HC$3.00 MF$0.65

THE DICHROISM AND BIREFRINGENCE OF POLYMERS CONTAINING POLYENE SEGMENTS, PART II.
Massachusetts Univ Amherst Polymer Research Inst
For primary bibliographic entry see Field 7D.
AD-666 625 HC$3.00 MF$0.65

THE ANISOTROPY OF THE POLARIZABILITY OF POLYENE SEGMENTS.
Massachusetts Univ Amherst Polymer Research Inst
For primary bibliographic entry see Field 7D.
AD-666 684 HC$3.00 MF$0.65

VIENNA INTERNATIONAL SYMPOSIUM--TISSUE ADHESIVES IN SURGERY,
Walter Reed Army Inst of Research Washington D C
For primary bibliographic entry see Field 6E.
AD-666 722 Not available from CFSTI.

POLYMER SYNTHESIS: A SURVEY OF GOVERNMENT CONTRACTS SINCE 1960,
Plastics Technical Evaluation Center Dover N J
For primary bibliographic entry see Field 7C.
AD-666 758 HC$3.00 MF$0.65

MOLECULAR-WEIGHT DEPENDENCE OF VISCOELASTIC PROPERTIES OF POLYSTYRENE SOLUTIONS,
Oklahoma State Univ Stillwater Dept of Physics
For primary bibliographic entry see Field 7D.
AD-666 864 Not available from CFSTI.

SPIN RESONANCE IN IRRADIATED PLASTICS.
Technical rept.,
Lockheed Missiles and Space Co Palo Alto Calif
Lockheed Palo Alto Research Lab
N. R. Lerner. 18 Oct 67, 42p Rept no. LMSC-6-77-67-45

Descriptors: (*Plastics, *Radiation damage), Free radicals, Electron spin resonance, Electron bombardment, Dose rate, Halocarbon plastics, Polyethylene plastics, Aromatic compounds, Polymers.
Identifiers: Polyphenylenes.

The report contains the results obtained from electron spin resonance studies performed on plastics exposed to high dose, nanosecond, pulses of electrons. The principal species of free radicals produced in each plastic studied are identified, and the response of each plastic to exposure to radiation, at various dose levels as evidenced by the free radical concentration, is given. (Author)
AD-667 156 HC$3.00 MF$0.65

KINETICS OF NYLON AND PHENOLIC PYROLYSIS.
Technical rept.,
Lockheed Missiles and Space Co Sunnyvale Calif
H. E. Goldstein. Oct 65, 49p Rept no. LMSC-667876

Descriptors: (*Nylon, Pyrolysis), (*Phenolic plastics, Pyrolysis), Reaction kinetics, Thermogravimetric analysis, Composite materials, Ablation.
Identifiers: *Ablative materials.

The report describes the pyrolysis kinetics of nylon 6-6 and phenolic CTL 91-LD, as derived from thermogravimetric analysis data (TGA). Individual rate equations and kinetic coefficients for the two polymers are presented and combined to yield a multi-step pyrolysis rate equation for composited nylon/phenolic. The derived rate equations are verified by comparing them to thermogravimetric data taken at rates of sample temperature rise varying from 3C/min to 100C/min. Weight-loss data for the nylon/phenolic composite, during both isothermal pyrolysis and pyrolysis at programmed rates of temperature rise, are accurately correlated by the multistep pyrolysis rate equation. (Author)
AD-667 181 HC$3.00 MF$0.65

INVESTIGATION OF RESIN SYSTEMS FOR IMPROVED ABLATIVE MATERIALS INTERIM REPORT, 10 JAN. - 1 JUL. 1966.
TRW Systems, Redondo Beach, Calif.
E. A. Burns, J. F. Jones, H. R. Lubowitz, and R. C. Nordberg. 25 Jul 66, 127p NASA-CR-72022, TRW-4550-6007-R0000
Contract NAS3-7949

Descriptors: *Cryogenic fluids, *Flox, *Fluorine compounds, *Hydrogen fuels, *Polyamide resins, *Silicone resins, *Synthetic resins, *Thermal resistance, Fracture strength, Methane, Oxidizers, Sulfones.

For abstract, see STAR 06 09.
N68-18535 HC$3.00 MF$0.65

THE INFLUENCE OF THE SEQUENCE LENGTH DISTRIBUTION ON THE UPPER MELTING RANGE OF COPOLYMERS.
Royal Aircraft Establishment, Farnborough (England).
For primary bibliographic entry see Field 7D.
For abstract, see STAR 06 09.
N68-19060 HC$3.00 MF$0.65

RADIATION-INDUCED GRAFT COPOLYMERIZATION OF STYRENE WITH POLYESTER FOIL AND CORD.
Radiacyjne Szczepienie Styrenu Na Folii Oraz Kordzie Z Politereftalanu Etylenowego
Polish Academy of Sciences, Warsaw. Inst. of Nuclear Research.
Z. Bulhak, and W. Zielinski. 1967, 16p INR-841/17/C
Lang- in Polish, English Summary

Descriptors: *Copolymerization, *Irradiation, *Polyesters, *Styrenes, Adhesion tests, Copolymers, Radiation effects, Solvents, Temperature effects.

For abstract, see STAR 06 09.
N68-19272 HC$3.00 MF$0.65

11J. Rubbers

THE POLARIZATION OF FLUORESCENT LIGHT FROM A UNIAXIALLY ORIENTED RUBBER.
Massachusetts Univ Amherst Polymer Research Inst
For primary bibliographic entry see Field 7D.
AD-666 623 HC$3.00 MF$0.65

STUDIES ON THE STRUCTURE OF RUBBERY POLYURETHANES.
Materials Research and Engineering rept.,
Army Natick Labs Mass Clothing and Organic Materials Lab
Stuart B. Clough, and Nathaniel S. Schneider. Jun 67, 28p Rept no. C/OM-MR/E-67-2
USA-NLABS-TR-67-77-CM

Descriptors: (*Isocyanate plastics, Molecular structure), (*Elastomers, Molecular structure), Mechanical properties, Permeability, Transformations, Phase studies, Chemical bonds, Differential thermal analysis, Colorimetry, Birefringence, X-ray diffraction analysis, Crystallization.

A variety of methods were used to obtain information about the structural organization and transitions in several polyester and polyether type polyurethanes in order to gain a better understanding of the factors which control the mechanical behavior and water vapor transmission of this important class of polymers. Thermal scanning methods reveal three characteristic transitions which are common to all samples. The low temperature transition is the major glass transition. An intermediate transition in the range of 60-80C is ascribed to urethane to polyester or polyether hydrogen bonding while the highest transition at 130-150C is attributed to interurethane bonding. A transition at 205C, which occurs only in the polyether samples, coincides with the melting of birefringent regions and is believed due to urethane crystallites. Light scattering measurements on this turbid sample indicate the existence of a wide range of structural order. Although crystallinity is absent in the unoriented samples, there is x-ray evidence of the stress induced crystallization of polyether or polyester segments. It is concluded that segregation of prepolymer and urethane segments into domain-like structure occurs in both types of polymers, but to a higher degree in the polyether than in the polyester based polymers, possibly due to restrictions in the latter imposed by interactions of the urethane and ester groups. (Author)
AD-666 753 HC$3.00 MF$0.65

POLYMER SYNTHESIS: A SURVEY OF GOVERNMENT CONTRACTS SINCE 1960,
Plastics Technical Evaluation Center Dover N J
For primary bibliographic entry see Field 7C.
AD-666 758 HC$3.00 MF$0.65

SYNTHESIS OF NEW FLUORINE-CONTAINING NITROSO COMPOUNDS, COPOLYMERS AND TERPOLYMERS.

Peninsular Chemresearch Inc Gainesville Fla
For primary bibliographic entry see Field 7C.
AD-666 801 HC$3.00 MF$0.65

THE DEVELOPMENT OF A CONSTITUTIVE RELATION FOR NEOPRENE BALLOON FILM,
New York Univ N Y Dept of Aeronautics and Astronautics
For primary bibliographic entry see Field 4B.
AD-666 930 HC$3.00 MF$0.65

ANIONIC COPOLYMERIZATION OF STYRENE AND ISOPRENE IN CYCLOHEXANE.
National Research Council of Canada Ottawa (Ontario) Div of Applied Chemistry
For primary bibliographic entry see Field 7D.
AD-667 069 Not available from CFSTI.

11L. Wood and Paper Products

AN EXPERIMENTAL AND MATHEMATICAL STUDY OF THE MECHANISM OF WOOD IGNITION.
Final rept. Apr 64-31 May 65,
Southwest Research Inst., San Antonio, Tex.
W. D. Weatherford, Jr., D. M. Sheppard, and M. L. Valtierra. 15 Nov 65, 51p SwRI-RS-472
Contracts OCS-OS-62-89, NBS-CST-1102

Descriptors: (*Ignition, *Wood), (*Cellulose, Ignition), Mathematical analysis, Thickness, Autoignition, Correlation techniques, Heating, Convection (Heat transfer), Test methods, Physical properties, Thermal properties, Surface area, Theory, Surface temperatures.

The results of experimental piloted ignition studies, when considered in the light of theoretical calculations, indicate that the primary criterion which must be satisfied in order to achieve sustained ignition of cellulose slabs in the continued presence of the ignition and heat sources is the attainment of a fixed fuel generation rate per unit surface area. Correlations of the experimental results (based upon four nominal slab thicknesses, three nominal slab densities, and three source temperature levels) reveal that the ignition criteria are substantially influenced by the physical and thermal properties of the slabs. (Author)
AD-474 021 HC$3.00 MF$0.65

THE EFFECT OF EXTRACTIVES ON WATER-VAPOR SORPTION BY WOOD.
Technical rept.,
Yale Univ New Haven Conn School of Forestry
Frederick F. Wangaard, and Luis A. Granados.
Dec 67, 26p Rept no. TR-39
Contract Nonr-609 (13)
See also TR-40, AD-665 907.
Availability: Published in Wood Science and Technology, v1 p253-77 1967.

Descriptors: (*Wood, Absorption), Water vapor, Regression analysis, Moisture, Humidity, Theory, Mathematical models, Tables.
Identifiers: Extractives.

The woods of different species vary widely in the nature and amount of their extractive content with a resultant variation in their sorption characteristics. This is particularly evident in the case of tropical woods, many of which are characterized by high extractive content. (Author)
AD-666 951 Not available from CFSTI.

SPECIES RESPONSE TO PRESTRESS IN CURVED LAMINATED WOOD BEAMS.
Technical rept.,
Yale Univ New Haven Conn School of Forestry
F. F. Wangaard, G. E. Woodson, and M. R. Murray. Jan 68, 9p Rept no. TR-41
Contract Nonr-609 (13)
See also TR-40, AD-665 907.
Availability: Published in Forest Products, Journal, v18 n1 p49-56 Jan 1968.

Descriptors: (*Wood, Laminates), (*Beams (Structural), Wood), Thickness, Stresses, Bending, Rupture, Loading (Mechanics), Analysis of variance, Damage, Flexural strength, Design.
Identifiers: *Prestressing.

Individual species differ in their response to the prestressing that is involved in the forming of curved laminated members. These differences can be attributed to the magnitude of the stress developed which varies with species, to possible damage that may be incurred as a result of these stresses, and to differences in stress relaxation. Further, as might be anticipated from the distribution or prestress in the laminated member, the effects of prestressing are quite different in beams that are loaded on the convex surface (stresses reversed) or on the concave surface (stresses additive). These effects are reflected in curvature-stress factor which denotes the relative strength of a curved beam in comparison with an equivalent straight beam. (Author)
AD-667 166 Not available from CFSTI.

STEAM POST-TREATMENTS TO REDUCE THICKNESS SWELLING OF PARTICLEBOARD (EXPLORATORY STUDY).
Forest Service research note,
Forest Products Lab Madison Wis
B. G. Heebink, and F. V. Hefty. Mar 68, 29p
Rept no. FSRN-FPL-0187

Descriptors: (*Fiberboard, Deformation), Thickness, Moisture, Wear resistance, Steam, Wetting, Drying, Panels (Structural), Flexural strength, Test methods, Bending, Effectiveness, Tables.
Identifiers: *Particle board.

For post-treatment, special apparatus was designed for a small hotpress so that particleboards could be steamed, with or without restraint against thickness swelling. Ten-minute treatments at 360F saturated steam, without restraint, were exceedingly effective in removing springback. (Author)
AD-667 175 HC$3.00 MF$0.65

HARDNESS MODULUS AS AN ALTERNATE MEASURE OF HARDNESS TO THE STANDARD JANKA BALL FOR WOOD AND WOOD-BASE MATERIALS.
Forest Service research note,
Forest Products Lab Madison Wis
Wayne C. Lewis. Mar 68, 15p Rept no. FSRN-FPL-0189

Descriptors: (*Wood, Hardness), Flexural strength, Thickness, Panels (Structural), Fiberboard, Penetration, Loading (Mechanics), Moisture, Test methods, Tables.
Identifiers: *Janka-ball hardness.

Comparisons of Janka-ball hardness values with hardness modulus (load versus depth of penetration of the hardness tool) on representative wood and wood-base materials indicate that a constant relationship exists between the two values. (Author)
AD-667 176 Not available from CFSTI.

12. MATHEMATICAL SCIENCES

12A. Mathematics and Statistics

OPTIMUM SEARCH FOR OBJECTS HAVING UNKNOWN ARRIVAL TIMES,
Sylvania El ronic Systems-West, Mountain View, Calif. Electronic Defense Labs.
For primary bibliographic entry see Field 16D.
AD-208 306 HC$3.00

DISCRIMINANT FUNCTIONS: PROPERTIES, CLASSES, AND COMPUTATIONAL TECHNIQUES.
Technical rept.,
Stanford Univ., Calif. Stanford Electronics Labs.
David West Peterson. Apr 65, 203p TR-6761-2, SU-SEL-65-021
Contract DA-04 (200)-AMC-57 (Z)

Descriptors: (*Communication theory, Functions), Decision theory, Algebra, Statistical analysis, Computers.
Identifiers: Discriminant functions.

The research described explores and compares properties of discriminant functions that are optimal with respect to one or more diverse criteria. A discriminant function is described as a real-valued function used in the process of deciding which of two or more states of nature is true. The present study is limited to problems involving two states of nature.
AD-465 281 HC$3.00 MF$0.65

A SIMPLIFIED TECHNIQUE FOR THE SYNTHESIS OF MODEL-REFERENCED ADAPTIVE CONTROL SYSTEMS.
Stanford Univ., Calif. Stanford Electronics Lab.
For primary bibliographic entry see Field 16D.
AD-483 444 HC$3.00 MF$0.65

A STARTING METHOD FOR SOLVING NONLINEAR VOLTERRA INTEGRAL EQUATIONS.
Technical summary rept.,
Wisconsin Univ Madison Mathematics Research Center
J. T. Day. Feb 66, 25p Rept no. MRC-TSR-631
Contract DA-31-124-ARO (D)-462

Descriptors: (*Integral equations, Numerical methods and procedures), Problem solving, Algorithms, Approximation (Mathematics), Transcendental functions, Accuracy.
Identifiers: Computer analysis, Runge-Kutta method.

A fifth order starting method is given for Volterra equations of the form y (t) = f (t) + the integral between the limits x sub 0, t of the quantity k (t,s,y (s))ds. Computational examples are given for the method as a starting method for the Gregory-Newton method. (Author)
AD-666 603 HC$3.00 MF$0.65

NUMERICAL STUDY OF THE NAVIER STOKES EQUATIONS IN THREE DIMENSIONS.
Wisconsin Univ Madison Mathematics Research Center
For primary bibliographic entry see Field 20D.
AD-666 604 HC$3.00 MF$0.65

SOME VARIANTS OF A FIXED POINT THEOREM OF KRASNOSELSKII AND APPLICATIONS TO NONLINEAR INTEGRAL EQUATIONS.
Technical summary rept.,
Wisconsin Univ Madison Mathematics Research Center
M. Z. Nashed, and J. S. W. Wong. Aug 67, 19p
Rept no. MRC-TSR-772
Contract DA-31-124-ARO (D)-462

Descriptors: (*Integral equations, Nonlinear systems), (*Perturbation theory, Banach space), (*Operators (Mathematics), Nonlinear systems), Mapping (Transformations), Functional analysis, Measure theory, Theorems.
Identifiers: Fixed point theorems, Existence theorems.

Several fixed point theorems are obtained for the sum of two operators, with applications to nonlinear integral equations of the mixed type. (Author)
AD-666 606 HC$3.00 MF$0.65

AN ITERATIVE PROCEDURE FOR THE SOLUTION OF NONLINEAR EQUATIONS IN A BANACH SPACE.
Technical summary rept.,
Wisconsin Univ Madison Mathematics Research Center

S. K. Aalto. Jul 67, 44p Rept no. MRC-TSR-774
Contract DA-31-124-ARO (D)-462

Descriptors: (*Functional analysis, Problem solving), Banach space, Hilbert space, Mapping (Transformations), Operators (Mathematics), Inequalities, Convergence, Iterative methods, Set theory, Theorems.
Identifiers: Existence theorems, Uniqueness theorem.

In 1964, Zarantonello published a constructive method for the solution of certain nonlinear problems in a Hilbert space. The present report extends the method in various directions including a generalization to a Banach space setting. A revealing geometric interpretation of the method yields guidelines for the analysis. (Author)
AD-666 607 HC$3.00 MF$0.65

COMPARISON THEOREMS FOR VOLTERRA EQUATIONS WITH RETARDED ARGUMENT.
Technical summary rept.,
Wisconsin Univ Madison Mathematics Research Center
A. I. Logunov, and Z. B. Caljuk. Sep 67, 10p
Rept no. MRC-TSR-780
Contract DA-31-124-ARO (D)-462
Trans. of unidentified article, tr. by Olena Thorne.

Descriptors: (*Integral equations, Problem solving), Inequalities, Theorems, USSR.
Identifiers: Translations.

Upper and lower bounds are obtained for solutions of Volterra integral equations with retarded argument. (Author)
AD-666 608 HC$3.00 MF$0.65

ON MULTIPLIERS OF DIFFERENCE SETS.
Technical summary rept.,
Wisconsin Univ Madison Mathematics Research Center
H. B. Mann, and S. K. Zaremba. Jan 68, 10p
Rept no. MRC-TSR-793
Contract DA-31-124-ARO (D)-462

Descriptors: (*Combinatorial analysis, Groups (Mathematics)), Set theory, Number theory, Rings (Mathematics), Mapping (Transformations), Theorems.

Let D be an Abelian difference set v,k, lambda with k-lambda = n = 2n sub 1, n sub 1 odd. For every prime divisor of q of n sub 1 let t be identically equal to q (superscript (f sub q)) (v). If n > lambda, (n sub 1, lambda) = 1 then t is multiplier of D. Necessary conditions are given for the existence of a difference set with v = 9 q squared -2, k = 6 q squared -2, lambda = 4 q squared -2.
AD-666 609 HC$3.00 MF$0.65

A NEW PROOF OF THE MAXIMUM PRINCIPLE FOR DOUBLY-HARMONIC FUNCTIONS.
Technical summary rept.,
Wisconsin Univ Madison Mathematics Research Center
H. B. Mann, J. Mitchell, and L. Schoenfeld. Sep 67, 9p Rept no. MRC-TSR-795
Contract DA-31-124-ARO (D)-462

Descriptors: (*Potential theory, Problem solving), Partial differential equations, Complex variables, Taylor's series, Polynomials, Theorems.
Identifiers: Maximum principle.

Using the theory of distributions, a new proof is given of the maximum principle for functions f which are nonconstant, Lebesgue integrable and doubly-harmonic on a domain in E sub 2m.
AD-666 610 HC$3.00 MF$0.65

UNIFORM APPROXIMATION BY TCHEBYCHEFFIAN SPLINE FUNCTIONS II. FREE KNOTS.
Technical summary rept.,
Wisconsin Univ Madison Mathematics Research Center
Larry Schumaker. Oct 67, 18p Rept no. MRC-TSR-810
Contract DA-31-124-ARO (D)-462
See also AD-662 709.

Descriptors: (*Functions, *Approximation (Mathematics)), Polynomials, Set theory, Mathematical logic, Theorems.
Identifiers: Spline functions, Existence theorems, Uniqueness theorem.

Existence, uniqueness and characterization of best uniform approximations of continuous functions by (Tchebycheffian) spline functions with free knots in (a,b) are investigated. (Author)
AD-666 611 HC$3.00 MF$0.65

BOUNDARY VALUE PROBLEMS FOR LINEAR SYSTEMS OF ORDINARY DIFFERENTIAL EQUATIONS INVOLVING MANY SMALL PARAMETERS.
Technical summary rept.,
Wisconsin Univ Madison Mathematics Research Center
R. E. O'Malley, Jr. Dec 67, 48p Rept no. MRC-TSR-821
Contract DA-31-124-ARO (D)-462

Descriptors: (*Differential equations, Problem solving), (*Perturbation theory, Boundary value problems), Matrix algebra, Transformations (Mathematics), Functions, Theorems.
Identifiers: Asymptotic solutions.

Complete asymptotic solutions, including 'boundary layer terms' are obtained. Results are related to those for singular perturbations of scalar equations. (Author)
AD-666 613 HC$3.00 MF$0.65

ON A BOUNDARY VALUE PROBLEM FOR A NONLINEAR DIFFERENTIAL EQUATION WITH A SMALL PARAMETER.
Technical summary rept.,
Wisconsin Univ Madison Mathematics Research Center
R. E. O'Malley, Jr. Dec 67, 24p Rept no. MRC-TSR-831
Contract DA-31-124-ARO (D)-462

Descriptors: (*Nonlinear differential equations, Problem solving), Approximation (Mathematics), Boundary value problems, Integral equations, Taylor's series, Power series, Perturbation theory, Convergence, Theorems.
Identifiers: Asymptotic solutions.

The paper presents a method of obtaining a complete, uniformly valid asymptotic solution for a class of two-point boundary value problems for nonlinear differential equations with a small parameter multiplying the highest derivatives. (Author)
AD-666 614 HC$3.00 MF$0.65

DUALITY IN DISCRETE PROGRAMMING. III. NONLINEAR OBJECTIVE FUNCTION AND CONSTRAINTS.
Carnegie-Mellon Univ Pittsburgh Pa Management Sciences Research Group
For primary bibliographic entry see Field 5A.
AD-666 627 HC$3.00 MF$0.65

UNIQUENESS UNDER NONLINEAR BOUNDARY CONDITIONS FOR ELLIPTIC PROBLEMS,
Maryland Univ College Park
Simon Levin. Dec 67, 19p
AROD-407:79
Grants DA-ARO (D)-31-124-G563, DA-ARO (D)-31-124-G676
Prepared in cooperation with Cornell Univ., Ithaca, N. Y. Research supported in part by NSF, grant GP-5882.
Availability: Published in Journal of Mathematics and Mechanics, v17 n6 p507-22 Dec 1967.

Descriptors: (*Partial differential equations, Nonlinear systems), Potential theory, Boundary value problems, Analytic functions, Theorems.
Identifiers: Uniqueness theorem, Quasilinear partial differential equations, Green's identities.

The purpose of this paper is to develop a method for generalizing Green's identities in order to study questions of uniqueness for quasilinear partial differential equations of second order under nonlinear boundary conditions. In particular, the general theory for elliptic equations is expounded in detail, and a number of examples illustrative of the technique are given. (Author)
AD-666 642 Not available from CFSTI.

FOUR METHODS OF SOLVING FOR THE SPHERICAL ERROR PROBABLE ASSOCIATED WITH A THREE-DIMENSIONAL NORMAL DISTRIBUTION.
Air Force Missile Development Center Holloman AFB N Mex
For primary bibliographic entry see Field 17I.
AD-666 646 HC$3.00 MF$0.65

ON VARIABLE METRIC METHODS OF MINIMIZATION.
Research Analysis Corp Mclean Va
For primary bibliographic entry see Field 12B.
AD-666 700 HC$3.00 MF$0.65

SYNTHESIS AND MINIMIZATION OF DIAGRAMS WITH REAL LOGICAL ELEMENTS OF THE TYPE AND-NOT OR OR-NOT,
Foreign Technology Div Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 9E.
AD-666 735 HC$3.00 MF$0.65

BOUNDARY-VALUE PROBLEMS FOR SECOND-ORDER DIFFERENTIAL EQUATIONS IN A BANACH SPACE. I,
Foreign Technology Div Wright-Patterson AFB Ohio
S. G. Krein, and G. I. Laptev. 29 Aug 67, 21p
Rept no. FTD-HT-67-128
Edited trans. of Differentsialnye Uraveneniya (USSR) v2 n3 p382-90 1966.

Descriptors: (*Functional analysis, Differential equations), (*Differential equations, Problem solving), Boundary value problems, Banach space, Matrix algebra, Theorems, USSR.
Identifiers: Translations.

It is indicated that a series of problems in mathematical physics (theory of wave-guides, hydrodynamics, and others) can be considered as boundary-value problems for the second-order equation the second derivative of u with respect to t = Au f (t), 0 = or < t = or < T, where u (t) is a function to be determined and f (t) is a given function of a complex Banach space E and A in a bounded linear operator. The solution u (t) is sought which satisfies a system of boundary conditions.
AD-666 738 HC$3.00 MF$0.65

A GENERAL FORTRAN PROGRAM FOR LEAST-SQUARES ANALYSIS OF VARIANCE.
Army Weapons Command Rock Island Ill Weapons Operations Research Office
Stuart Olson. Jan 68, 36p Rept no. OR-68-1

Descriptors: (*Analysis of variance, Least squares method), (*Programming (Computers), Analysis of variance), Combinatorial analysis, Mathematical prediction, Statistical analysis, Flow charting, Computer programs.
Identifiers: FORTRAN.

The report describes a computer program written in FORTRAN language designed to be used for the majority of least-squares analysis of variance computations. The program is completely general in the sense of its ability to handle any size of factorial-type of design. A user's control card sets the number of factors, k, and the maximum number of levels per factor. Interaction sums of squares may be obtained to a maximum depth of k-1. In computing the sums of squares for a category of variance, the number of observations are counted concurrently with the summing of them. This allows for analysis of experiments with missing data and for unbalanced designs in which no observations may exist at certain levels of some factors without the need for artificial techniques for estimating the missing data. The program consists of three main parts; initialization and input of observations, computations of raw (uncorrected) sums of squares, and correction of raw sums of squares and output. The user is required to write his own input subroutine which interfaces the user's input card file with observation storage of the main program. (Author)
AD-666 748 HC$3.00 MF$0.65

TESTING INDEPENDENCE OF AN l-VECTOR AND AN m-VECTOR WHOSE JOINT DISTRIBUTION IS NORMAL-PRELIMINARY REPORT.
Technical rept.,
Research Triangle Inst Durham N C
David G. Herr. 31 Jan 68, 19p Rept no. RTI-SU-207
AROD-5506:6-M
Contract DA-31-124-ARO (D)-323

Descriptors: (*Statistical analysis, Problem solving), Probability, Multivariate analysis, Set theory, Measure theory, Matrix algebra, Transcendental functions, Theorems.
Identifiers: Likelihood ratio tests.

The report is concerned with the investigation of tests of independence of an l-vector and an m-vector whose joint distribution is normal. The tests under comparison are Roy's test and the likelihood ratio test. (Author)
AD-666 778 HC$3.00 MF$0.65

STATISTICAL TECHNIQUES FOR SELECTION OF DETERMINISTIC AND STOCHASTIC MODELS IN OPTIMIZATION STUDIES.
Research Triangle Inst Durham N C
For primary bibliographic entry see Field 12B.
AD-666 779 HC$3.00 MF$0.65

A LIKELIHOOD RATIO TEST PARADOX.
Technical rept. no. 5, 1 Feb 67-31 Jan 68,
Research Triangle Inst Durham N C
Babubhai V. Shah. Feb 68, 17p
AROD-5506:7-M
Contract DA-31-124-ARO (D)-323

Descriptors: (*Statistical analysis, Mathematical logic), Probability, Population (Mathematics), Random variables, Statistical tests, Sampling, Number theory, Measure theory, Correlation techniques, Theorems.
Identifiers: Likelihood ratio tests.

A comparison of likelihood ratio tests for testing the mean of a normal population from the sample of size N is made.
AD-666 780 HC$3.00 MF$0.65

COMPARISON OF DESIGNS FOR DISCRIMINATING BETWEEN REGRESSION MODELS.
Technical rept.,
Research Triangle Inst Durham N C
A.C. Nelson, Jr. Feb 68, 16p Rept no. TR-6
AROD-5506:8-M
Contract DA-31-124-ARO (D)-323

Descriptors: (*Statistical analysis, Mathematical models), Regression analysis, Sequential analysis, Optimization, Sampling, Correlation techniques, Numerical methods and procedures.

Several sequential design procedures for discriminating between two regression models have been suggested in recent years. The essence of the results is that the sequential design is essentially independent of which model is correct. This result is investigated in this study for the fixed sample size design and for the simple case of a linear versus a quadratic model, both through the origin, as this is the only case for which the sequential designs have been tabulated. The results here are substantially in agreement with those for sequential designs as the model dependence of the design allocations are not large by practical considerations. The approach suggested offers the possibility of designing a preliminary experiment for the sequential test procedure. Of course, in physical situations where the sequential design approach is not practical, the fixed sample approach will be necessary. Two criteria are considered in the selection of a design (1) an optimal design using a composite model and a minimal confidence region, and (2) an optimal design using the lack-of-fit test as given in the literature. The first approach is preferred for estimation of unknown parameters whereas the second is preferred for discrimination between the hypothesized models. (Author)
AD-666 788 HC$3.00 MF$0.65

ON GENERALIZED MATRIX FUNCTIONS.
Systems research memo.,
Northwestern Univ Evanston Ill Technological Inst
John B. Hawkins, and Adi Ben-Israel. Jan 68, 22p Rept no. SRM-193
Contracts Nonr-1228 (10), DA-31-124-ARO (D)-322
Research supported in part by NSF Contract GP-7550.

Descriptors: (*Matrix algebra, Theorems), Vector spaces, Complex numbers.
Identifiers: *Matrix functions.

The paper contains 2 sections. In section 1 the spectral theory for rectangular complex matrices, as given by Penrose and Hestenes is reformulated so as to include the spectral theory for normal matrices as a special case. These results, which are mostly well known, are used in section 2 to study matric functions of rectangular complex matrices. These functions are shown in theorem 4 to satisfy an appropriate version of the Fantappie requirements. Theorems 5 and 6 are the analogs of Cauchy's integral theorem and Taylor's theorem respectively. (Author)
AD-666 813 HC$3.00 MF$0.65

FINITE EXPANSION OF A HOLE IN A RIGID-WORKHARDENING DISK OF INITIALLY NON-UNIFORM THICKNESS.
California Univ San Diego La Jolla Dept of the Aerospace and Mechanical Engineering Sciences
For primary bibliographic entry see Field 7B.
AD-666 831 HC$3.00 MF$0.65

CERTAIN NUMERICAL PROPERTIES OF THE LEGENDRE FUNCTION AND THE ASSOCIATED LEGENDRE FUNCTION,
Aerospace Corp San Bernardino Calif San Bernardino Operations
P. S. Jorgensen. Mar 68, 16p Rept no. TOR-0158 (S3930-43)-3
Contract F04695-67-C-0158

Descriptors: (*Special functions (Mathematical), Numerical methods and procedures), Harmonic analysis, Integral equations, Boundary value problems, Spheres, Gravity, Earth (Planet).
Identifiers: Legendre functions.

The Legendre function and the associated Legendre function are orthogonal sets of functions, i.e., the integral of the square of a normalized function is unity and the integral of any pair of functions of different degree is zero. This will be only approximately true when ideal integration is replaced by a simple numerical summation. In doing this, certain curious numerical properties have been observed which are discussed by a few illustrative examples. The practical implication of these numerical aspects of the Legendre function, when performing harmonic analysis in spherical coordinates, is discussed. (Author)
AD-666 919 HC$3.00 MF$0.65

ELEMENTS OF APPROXIMATION THEORY FOR SIGNALS AND SYSTEMS.
Technical rept.,
Reza (F M) Syracuse N Y
F. M. Reza. Feb 68, 56p
RADC-TR-67-648
Contract F30602-68-C-0062

Descriptors: (*Approximation (Mathematics), Least squares method), (*Functional analysis, Problem solving), Polynomials, Hilbert space, Linear systems, Networks, Information theory, Random variables, Probability, Integral transforms, Response, Numerical analysis.
Identifiers: Euclidean space.

The report contains an exposition of the essentials of the theory of linear least square approximation for scientists. Its format is based on the modern methods of functional analysis, namely the projection theory of Hilbert space. The content of the report is best appreciated by the reader who has some knowledge of Hilbert space theory. The unifying concept which prevails throughout the report allows the treatment of the problems of least square approximation in a variety of fields. Applications to problems of linear systems, networks, and communication theory are included. (Author)
AD-666 938 HC$3.00 MF$0.65

NONLINEAR BOUNDARY VALUE PROBLEMS FOR THE CIRCULAR MEMBRANE.
New York Univ N Y Courant Inst of Mathematical Sciences
For primary bibliographic entry see Field 20K.
AD-666 961 HC$3.00 MF$0.65

USE OF THE IMPLICIT FUNCTION THEOREM IN SOLVING SYSTEMS OF EQUATIONS.
Research rept.,
Navy Underwater Sound Lab New London Conn
Marvin J. Goldstein. 2 Feb 68, 25p Rept no. USL-858

Descriptors: (*Equations, Problem solving), Determinants, Curve fitting, Linear systems, Nonlinear systems, Polynomials, Differential equations, Numerical methods and procedures, Sequences, Convergence, Theorems.
Identifiers: Implicit function theorem.

Applications of the implicit function theorem in solving systems of n equations in (n + p) unknowns subject to p nonlinear 'constraints' are discussed. A generalized iterative technique that is defined for a sufficiently restricted 'region' is derived for solving the set of (n + p) equations. The derivation employs Newton's method and assumes that the unconstrained (n + p) system of equations has a local vector function solution that satisfies the p constraints at a unique point in its 'prescribed region' of definition. The implicit function theorem is further employed to derive mathematical formulas that characterize the conditions of the solutions of systems of linear equations and the zeros of polynomials with real coefficients. (Author)
AD-666 971 HC$3.00 MF$0.65

UN RISULTATO RELATIVO AD EQUAZIONI ELLITTICHE DEL SECONDO ORDINE DI TIPO NON VARIAZIONALE (A Result Concerning Elliptic Equations of the Second Order and of Non Variational Type).

Scientific Interim rept.,
Pisa Univ (Italy)
Sergio Campanato. 3 Feb 68, 11p
AFOSR-68-0573
Grant AF-AFOSR-38-67
Text in Italian, attached summary in English.
Availability: Published in Annali della Scuola Normale Superiore, v21 n4 p701-7 1967.

Descriptors: (*Partial differential equations, Problem solving), Operators (Mathematics), Convex sets, Theorems, Italy.
Identifiers: Dirichlet problem.

Given is an elliptic non variational operator with measurable bounded coefficients on a bounded convex set. It is proven that there exist two real numbers such that the Dirichlet problem has a unique solution.
AD-667 001 Not available from CFSTI.

ALGEBRAS WITH SAME MULTIPLICATIVE MEASURES.
Interim rept.,
Massachusetts Inst of Tech Cambridge
John Garnett, and Irving Glicksberg. Feb 68, 13p
AFOSR-68-0570
Grant AF-AFOSR-335-63
Availability: Published in Journal of Functional Analysis, v1 n3 p331-41 Oct 67.

Descriptors: (*Measure theory, *Algebra), Functional analysis, Set theory, Sequences, Convergence, Potential theory, Approximation (Mathematics), Theorems.

The note is an addendum to Glicksberg, I., The abstract F. and M. Riesz theorem, J. Functional Anal. vol. 1 (1967) pp. 109-122. The primary purpose is to improve some results given there.
AD-667 003 Not available from CFSTI.

THE CONNECTIVITY FUNCTION OF A GRAPH,
Michigan Univ Ann Arbor Dept of Mathematics
For primary bibliographic entry see Field 12B.
AD-667 013 Not available from CFSTI.

SUB- AND SUPERHARMONIC SYNCHRONIZATION IN WEAKLY NONLINEAR SYSTEMS: INTEGRAL CONSTRAINTS AND DUALITY.
Technical rept.,
Harvard Univ Cambridge Mass Div of Engineering and Applied Physics
Samuel A. Musa, and Richard E. Kronauer. Mar 68, 20p Rept no. TR-555
Contracts N00014-67-A-0298-0006, Nonr-1866 (16)
Availability: Published in Quarterly of Applied Mathematics, v25 n4 p399-414 Jan 68.

Descriptors: (*Oscillation, Nonlinear systems), (*Nonlinear differential equations, Problem solving), Force (Mechanics), Periodic variations, Dynamics, Resonant frequency, Response.
Identifiers: Van der Pol equation.

A forced system described by the differential equation: x double prime + epsilon f (x, x') + (omega sub o)squared x = F cos omega t is considered for cases where (n/m)omega is close to omega sub o. (Here m and n are integers and n/m > 1 denotes superharmonic while n/m < 1 denotes subharmonics.) If the unforced system (F = 0) is conservative, the forced system is shown to possess an integral constraint and the solution is reduced to quadratures, even though the force adds or removes energy from the oscillations. Furthermore, the sub- and superharmonic cases where the n/m ratios are inverse are shown to be intimately related, and results for one can be deduced from the other by appropriate interchange of variables. For systems which are nonconservative (when F = 0), there is a general class, including the frequently discussed Van der Pol oscillator, whose members are mathematical duals of appropriate conservative systems with added linear dissipation. Both the nonconservative system and its 'conservative' dual are forced. The duality consists of an interchange of the roles of the dissipation and detuning between the systems and yields a pair of phase portraits with singularities located at identical points and orthogonal phase trajectories. Examples for polynomial nonlinearities are given and in considerable detail for the power 5. (Author)
AD-667 017 Not available from CFSTI.

SCATTERING THEORY WITH TWO HILBERT SPACES.
Interim rept.,
California Univ Berkeley Dept of Mathematics
Tosio Kato. Oct 67, 30p
AFOSR-68-0610
Grant AF-AFOSR-553-64
Availability: Published in Journal of Functional Analysis, v1 n3 p342-69 Oct 67.

Descriptors: (*Operators (Mathematics), *Functional analysis), Measure theory, Hilbert space, Groups (Mathematics), Scattering, Boundary value problems, Convergence, Theorems.
Identifiers: Scattering theory, Wave equations, Maxwell's equations, Asymptotic behavior.

The ordinary scattering theory deals with the asymptotic properties of the product of two unitary groups in a Hilbert space. This theory is useful for the simple (=one-channel) scattering associated with a Schrodinger operator in quantum mechanics. But it is not adequate for scattering related to the classical wave equations and others. In this paper a general scattering theory with two unitary groups acting in two different Hilbert spaces, is developed, with an identification operator linking the two spaces. The results are then applied to the scattering problems for the Maxwell equations, the wave equations with potentials, and the wave equations with obstacles. (Author)
AD-667 020 Not available from CFSTI.

ON THE VARIATIONAL PRINCIPLES FOR EIGENVALUES FOR A CLASS OF UNBOUNDED OPERATORS,
American Univ Washington D C
William Stenger. Mar 68, 11p
AFOSR-68-0623
Grant AF-AFOSR-1306-67
Availability: Published in Journal of Mathematics and Mechanics, v17 n7 p641-8 Jan 1968.

Descriptors: (*Operators (Mathematics), Vector spaces), Hilbert space, Functional analysis, Inequalities, Perturbation theory, Theorems.
Identifiers: Variational principles, Eigenvalues.

In the literature there appear two variational principles for the higher eigenvalues of a compact symmetric (or hermitian) operator. For the purposes of the present paper the authors refer to the well known characterization, which is based on the inequalities of H. Weyl, as the maximum-minimum principle and to the lesser known one, which is based on Poincare's inequalities, as the minimum-maximum principle. It must be emphasized here that their terminology identifies two fundamentally different principles and not a trivial interchange effected by reordering the eigenvalues. There is an important class of unbounded self-adjoint operators of the type appearing in Schroedinger theory for which they establish these principles. Until now only analogous results using infima and suprema, as opposed to minima and maxima, were proved. The minimum-maximum principle is easily extended to a suitable class of unbounded operators. On the other hand, the maximum-minimum principle for non-compact operators contains an essential difficulty. Namely, they require the minimum of the Rayleigh quotient on an infinite-dimensional space. In view of the complementary nature of these two principles, they conclude the present paper by introducing a new unifying variational characterization, called the maxi-mini-max principle, which contains each of the two preceding characterizations as a special case. (Author)
AD-667 028 Not available from CFSTI.

ON THE LIFTING PROPERTY,
Illinois Univ Urbana Dept of Mathematics
A. Ionescu Tulcea. Jun 67, 26p
AROD-5254:12
Contract DA-31-124-ARO (D)-288
Availability: Published in Proceeding of Symposium in Analysis held at Queen's Univ., Kingston (Ontario), Jun 1967 p171-91.

Descriptors: (*Measure theory, Vector spaces), (*Groups (Mathematics), Topology), Set theory, Mapping (Transformations), Hilbert space, Theorems.

The paper is concerned with (1) liftings and topologies associated with liftings; (2) strong liftings and liftings compatible with topologies; (3) liftings commuting with the left translations of a locally compact group; (4) some topological preliminaries; and (5) an application. (Author)
AD-667 031 Not available from CFSTI.

ON LEMMA 3 of ZEEMAN.
Turin Univ (Italy) Inst of Theoretical Physics
For primary bibliographic entry see Field 20J.
AD-667 089 Not available from CFSTI.

A CLASS OF FUNCTIONAL EQUATIONS OF NEUTRAL TYPE,
Brown Univ Providence R I Div of Applied Mathematics
Jack K. Hale, and Kenneth R. Meyer. Feb 68, 70p
AFOSR-68-0553
Contract DA-31-124-ARO (D)-270, Grant AF-AFOSR-693-66
Availability: Published in Memoirs of the American Mathematical Society, n76 p1-65 1967.

Descriptors: (*Functional analysis, Problem solving), Invariance, Matrix algebra, Functions, Topology, Stability, Banach space, Operators (Mathematics), Mapping (Transformations), Groups (Mathematics), Differential equations, Integral equations, Nonlinear systems.
Identifiers: Eigenvalues, Existence theorems, Uniqueness theorem, Asymptotic behavior.

The approach in this paper is to investigate a class of functional integral equations in the space of continuous functions. This class includes certain types of equations of neutral type and does include some equations which arise in the applications. For this class of equations, precise analogues of the above stated properties of ordinary differential equations are obtained. Furthermore, the decomposition of our space into invariant subspaces is given in a way that is amenable to computations. As specific applications of the theory, a stability theorem is given and the method of averaging to these systems is extended. (Author)
AD-667 090 Not available from CFSTI.

A LINEAR PROGRAMMING FORMULATION OF COMMUNICATION NETWORKS WITH MEMORY.
Northwestern Univ Evanston Ill Dept of Electrical Engineering
For primary bibliographic entry see Field 17B.
AD-667 095 Not available from CFSTI.

STUDY OF NONPARAMETRIC TECHNIQUES FOR ESTIMATING RELIABILITY AND OTHER LIFE QUALITY PARAMETERS FINAL REPORT.
Douglas Aircraft Co., Inc., Santa Monica, Calif. Missile and Space Systems Div.
V. K. Murthy. Feb 68, 117p NASA-CR-93483, DAC-62180
Contract NASW-1367

Descriptors: *Confidence limits, *Probability density functions, *Probability distribution functions, *Service life, *Statistical analysis, Estimates, Probability theory, Quality control, Random sampling, Reliability engineering.

For abstract, see STAR 06 09.
N68-18499 HC$3.00 MF$0.65

RIEMANN'S PROBLEM WITH CONTINUOUS COEFFICIENT.
Krayevaya Zadacha Rimana S Nepreryvnym Koeffitsiyentom
Scripta Technica, Inc., Washington, D. C.
I. B. Simonenko. Mar 68, 6p NASA-TT-F-11551
Contract NASW-1694
Coll- 6 P Refs Tran- Transl. Into English From Dokl. Akad. Nauk Sssr, V. 124, No. 2, 1959 P 278-281

Descriptors: *Boundary value problems, *Cauchy problem, *Problem solving, Approximation, Integral calculus, Liapunov functions, Operators (mathematics), Riemann manifold.

For abstract, see STAR 06 09.
N68-18817 HC$3.00 MF$0.65

ONE-DIMENSIONAL SEARCH COMBINING - GOLDEN SECTION AND CUBIC FIT TECHNIQUES QUARTERLY REPORT.
Analytical Mechanics Associates, Westbury, N.Y.
G. Guilfoyle, I. Johnson, and P. Wheatley. Jan 67, 20p NASA-CR-65994, REPT.-67-1
Contract NAS9-4036

Descriptors: *Computer programs, *Cubic equations, *Functions (mathematics), *Real variables, Flow charts, Intervals, Iterative solution, Mathematical models, Searching.

For abstract, see STAR 06 09.
N68-18823 HC$3.00 MF$0.65

DIMENSIONAL ANALYSIS HANDBOOK ARRANGEMENT RELATIONSHIPS FOR DIMENSIONAL ANALYSIS (ARDA).
Tennessee Univ., Memphis. Herff School of Engineering.
H. F. Mullikin. 1967, 223p NASA-CR-61634
Conf- Presented At the Nasa-asee Summer Faculty Fellowship Program, 13 Jun. - 19 Aug. 1966
Rean- Revised

Descriptors: *Applications of mathematics, *Correlation coefficients, *Data processing, *Test equipment, Convective heat transfer, Data acquisition, Fluid dynamics, Handbooks, Statistical correlation.

For abstract, see STAR 06 09.
N68-18980 HC$3.00 MF$0.65

THE THEORY AND APPLICATION OF LEAST SQUARES.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
G. A. Smith. Dec 67, 45p NASA-TM-X-63127, X-565-67-601

Descriptors: *Data smoothing, *Least squares method, *Linear equations, *Nonlinear equations, *Transformations (mathematics), Orthogonal functions, Polynomials.

For abstract, see STAR 06 09.
N68-19109 HC$3.00 MF$0.65

A NEW METHOD OF TESTING SMALL SAMPLES FOR GOODNESS OF FIT TO NORMAL POPULATIONS.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
P. D. Argentiero, and R. H. Tolson. Mar 68, 319p NASA-TN-D-4405
Contract 129-04-01-01-23

Descriptors: *Frequency distribution, *Mathematical models, *Populations, *Random sampling, *Statistical analysis, Fitting, Functions (mathematics), Probability theory, Random variables.

For abstract, see STAR 06 09.
N68-19144 HC$3.00 MF$0.65

GEOMETRIC THEORY OF FUNCTIONAL DIFFERENTIAL EQUATIONS.
Brown Univ., Providence, R. I.
J. K. Hale. 1965, 31p NASA-CR-70260
Contracts NGR-40-002-015, AF-AFOSR-693-65
Conf- Presented At the Intern. Symp. on Differential Equations and Dynamical Systems, Puerto Rico, Dec. 1965

Descriptors: *Differential equations, *Floquet theorem, *Liapunov functions, *Saddle points (game theory), *Vector spaces, Asymptotic methods, Bernoulli theorem, Bibliographies, Functions (mathematics), Geometry, Mathematical models, Trajectories.

For abstract, see STAR 06 09.
N68-19438 HC$3.00 MF$0.65

APPROXIMATE SOLUTION OF A TWO-POINT BOUNDARY VALUE PROBLEM.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
E. R. Lancaster. Mar 68, 6p NASA-TM-X-63139, X-643-68-79

Descriptors: *Approximation, *Boundary value problems, *Problem solving, Formulas (mathematics), Orbit calculation, Polynomials, Transfer orbits.

For abstract, see STAR 06 09.
N68-19449 HC$3.00 MF$0.65

STUDIES IN TRAVEL DEMAND. VOLUME III.
Mathematica, Princeton, N. J.
For primary bibliographic entry see Field 13F.
PB-177 610 HC$3.00 MF$0.65

12B. Operations Research

MAXIMIZATION OF SYSTEM RELIABILITY WITH LIMITED RESOURCES.
Research rept.,
California Univ Berkeley Operations Research Center
Lawrence D. Bodin. Jul 67, 24p Rept no. ORC-67-40
AROD-5307:30-M
Contracts Nonr-3656 (18), DA-31-124-ARO-D-331

Descriptors: (*Reliability (Electronics), Optimization), Series, Resistors, Transistors, Costs, Graphics, Networks, Theorems.

The optimization of system reliability of a series parallel system containing t types of components is found where the cost of purchasing the components is disregarded, a component can be assigned to more than one component position, and a limited supply of components is available for assignment. The optimal solution is found by ranking the reliabilities of the components of each type and searching over these ranks in the orders specified in this paper. (Author)
AD-666 619 HC$3.00 MF$0.65

COST FUNCTIONS AND BUDGETS (COST CONSIDERATIONS IN SYSTEMS ANALYSIS),
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 5A.
AD-666 656 HC$3.00 MF$0.65

LEARNING THROUGH PATTERN RECOGNITION APPLIED TO A CLASS OF GAMES.
Case-Western Reserve Univ Cleveland Ohio Systems Research Center
For primary bibliographic entry see Field 9B.
AD-666 673 HC$3.00 MF$0.65

ALGEBRA AUTOMATA I: PARALLEL PROGRAMMING AS A PROLEGOMENA TO THE CATEGORICAL APPROACH.
Stanford Univ Calif Dept of Electrical Engineering
For primary bibliographic entry see Field 9B.
AD-666 677 HC$3.00 MF$0.65

DECOMPOSITION THEORY OF SEMIAUTOMATA AND AUTOMATA.
Stanford Research Inst Menlo Park Calif
For primary bibliographic entry see Field 9B.
AD-666 689 HC$3.00 MF$0.65

REGULAR EXPRESSIONS AND CHECKING EXPERIMENTS,
Polytechnic Inst of Brooklyn N Y Microwave Research Inst
For primary bibliographic entry see Field 9B.
AD-666 696 HC$3.00 MF$0.65

ON VARIABLE METRIC METHODS OF MINIMIZATION.
Technical paper,
Research Analysis Corp Mclean Va
John D. Pearson. Feb 68, 36p Rept no. RAC-TP-302
Contract DA-44-188-ARO-1

Descriptors: (*Mathematical programming, Algorithms), Saddle point method, Numerical methods and procedures, Matrix algebra, Theorems.

Two basic approaches to the generation of conjugate directions are considered for the problem of unconstrained minimization of a quadratic function. Using the principle of choosing a step direction orthogonal to the previous gradient changes, a projected gradient algorithm and a class of variable metric algorithms are derived. Three variants of the class are developed into algorithms, one of which is the Fletcher-Powell-Davidon scheme. Numerical results indicate the merits of the new algorithms compared to several now in use, for a variety of nonquadratic problems. (Author)
AD-666 700 HC$3.00 MF$0.65

NAVAL RESEARCH LOGISTICS QUARTERLY. VOLUME 15, NO. 1, MARCH 1968.
Office of Naval Research Washington D C
For primary bibliographic entry see Field 15E.
AD-666 732 MF$0.65

CONTROLS LEADING TO OPTIMAL STATIONARY REGIMES,
Foreign Technology Div Wright-Patterson AFB Ohio
O. V. Viskov, and A. N. Shiryaev. 19 Sep 67, 20p Rept no. FTD-HT-67-69
Edited trans. of Akademiya Nauk SSSR. Matematicheskii Institut. Trudy, v71 p34-45 1964.

Descriptors: (*Statistical processes, Optimization), Probability, Control systems, Measure theory, Topology, Stability, Theorems, USSR.
Identifiers: Optimal control theory, Translations.

The authors define a controlled Markov chain as one for which the passage probabilities are defined by P (xi sub (n + 1) = X sub (n + 1) (vertical line) xi sub n, d sub n); n = 0,1,... where d sub n is an element which may be chosen from a space D as a function of x sub 0,...,x sub n. A choice of d sub n (x sub 0,...,x sub n) for each n = or > 0 is called a control delta; and it is noted that the process (xi, delta), xi = (xi sub 1, xi sub 2,...), delta = (d sub 1, d sub 2,...) is generally not really Markovian (since the further past has too much influence). The control delta is called Markovian if each of the functions d sub n depends only on x sub n, and

homogeneous Markovian if in addition, all d sub n are the same. The authors define admissible controls; they define optimal controls in terms of a loss function W (x, d) where x is the state of the system and d the chosen control. They answer the question of existence of optimal controls and optimal homogeneous Markov controls for the very special case of finite state and control spaces.
AD-666 741 HC$3.00 MF$0.65

STATISTICAL TECHNIQUES FOR SELECTION OF DETERMINISTIC AND STOCHASTIC MODELS IN OPTIMIZATION STUDIES.
Final rept. 1 Feb 65-31 Jan 68,
Research Triangle Inst Durham N C
A. Carl Nelson, Jr., and Robert E. Bohrer. Feb 68, 15p
AROD-5506:9-M
Contract DA-31-124-ARO (D)-323

Descriptors: (*Optimization, *Statistical analysis), (*Operations research, Reports), Mathematical models, Population (Mathematics), Sampling, Statistical tests, Combinatorial analysis, Regression analysis, Mathematical programming, Stochastic processes, Sequences.
Identifiers: Central limit theorem, Likelihood ratio tests.

A summary of the research performed by RTI for the last three years on the Military Theme Operations Research is given in this final report. The research covers a broad range of topics concerning statistical test procedures and statistical designs. (Author)
AD-666 779 HC$3.00 MF$0.65

A RELAXED INTERIOR APPROACH TO NONLINEAR PROGRAMMING.
Technical paper,
Research Analysis Corp Mclean Va
James E. Falk. Dec 67, 25p Rept no. RAC-TP-279
Contract DA-44-188-ARO-1

Descriptors: (*Mathematical programming, Problem solving), Nonlinear programming, Set theory, Functions, Inequalities, Algorithms, Optimization, Theorems.
Identifiers: Penalty functions, Convex programming.

The paper contains the mathematical validation of a new approach to mathematical programming problems based on a penalty-function method. The given problem is replaced by a second 'auxiliary' problem, which in many cases may be solved by standard methods since it involves the maximization of a concave function of a single variable over an interval. The auxiliary problem is defined implicitly in terms of the constituents of the original problem. Examples are presented to illustrate the theoretical results. (Author)
AD-666 785 HC$3.00 MF$0.65

AUTO-CORRELATION OF DEMAND IN A MULTI-ECHELON SYSTEM.
Frankford Arsenal Philadelphia Pa Inventory Research Office
For primary bibliographic entry see Field 15E.
AD-666 786 HC$3.00 MF$0.65

MACHINE SEQUENCING VIA DISJUNCTIVE GRAPHS: AN IMPLICIT ENUMERATION ALGORITHM.
Research rept.,
Carnegie-Mellon Univ Pittsburgh Pa Management Sciences Research Group
Egon Balas. Feb 68, 20p Rept no. RR-125
Contract Nonr-760 (24)

Descriptors: (*Operations research, Scheduling), (*Production control, Scheduling), (*Scheduling, Graphics), Set theory, Iterations, Minimax technique, Optimization, Management planning, Algorithms.
Identifiers: Critical path method, PERT.

A disjunctive graph is a generalized graph some of whose arcs are disjunctive. Such graphs translate a variety of scheduling-type problems, like machine sequencing. The latter problem can be reduced to that of finding a minimaximal path (shortest critical path) in a disjunctive PERT network. The present paper describes an implicit enumeration algorithm for finding such a path by solving a sequence of PERT problems. The algorithm finds at an early stage a local optimum; thus one can stop at any moment with a reasonably 'good' feasible solution. The number of PERT problems whose data are to be stored at any given moment cannot exceed the number of disjunctive pairs of arcs. (Author)
AD-666 810 HC$3.00 MF$0.65

ON OPTIMAL SOLUTIONS OF 2-PERSON 0-SUM GAMES.
Systems research memo.,
Northwind Wagb-282 Seattle Wash
Adi Ben-Israel. Mar 68, 8p Rept no. SRM-195
Contracts Nonr-1228 (10), DA-31-124-ARO (D)-322
Research supported in part by NSF Contract GP-7550.

Descriptors: (*Game theory, Problem solving), Optimization, Vector spaces, Matrix algebra, Linear programming, Theorems.

Optimal solutions of 2-person 0-sum games are characterized in terms of certain submatrices of the payoff matrix. (Author)
AD-666 814 HC$3.00 MF$0.65

ON WEAKLY BALANCED GAMES AND DUALITY THEORY.
Systems research memo.,
Northwestern Univ Evanston Ill Technological Inst
Abraham Charnes, Kenneth O. Kortanek, and Mark Eisner. Feb 68, 27p Rept nos. TR-44, SRM-200
Contracts DA-31-124-ARO (D)-322, Nonr-1228 (10)
Research supported in part by NSF grant GP-7550.

Descriptors: (*Game theory, Problem solving), (*Linear programming, Game theory), Topology, Operators (Mathematics), Vector spaces, Set theory, Theorems.

The notion of a 'weakly balanced game' under very general conditions involving no topology whatever is defined. The work of Schmeidler is extended by establishing duality results for a pair of (possibly) infinite dimensional linear programming problems arising from a generalized game. A necessary and sufficient condition is given in order that a separating hyperplane argument can be employed to prove the existence of a candidate core member for a weakly balanced game. This candidate is shown to be in the core if and only if the game is balanced. No use is made of topological ideas, but conditions are given under which the core member takes on values in a bounded set. The Charnes-Kortanek M-operator is used to characterize the redundancy of certain coalition values in restriction core membership.
AD-666 815 HC$3.00 MF$0.65

ON MINIMIZATION OF TRAJECTORY SENSITIVITY,
Grumman Aircraft Engineering Corp Bethpage N Y Research Dept
For primary bibliographic entry see Field 22D.
AD-666 825 Not available from CFSTI.

A CHANCE-CONSTRAINED APPROACH TO CAPITAL BUDGETING WITH PORTFOLIO TYPE PAYBACK AND LIQUIDITY CONSTRAINTS AND HORIZON POSTURE CONTROLS,
Northwestern Univ Evanston Ill Systems Research Group
A. Charnes, R. Byrne, W. W. Cooper, and K. Kortanek. 1967, 27p
Contracts Nonr-1228 (10), DA-31-124-ARO (D)-322
Prepared in cooperation with Carnegie-Mellon Univ., Pittsburgh, Pa., Contract Nonr-760 (24) Proj. NR-047-048; Pittsburgh Univ., Pa., and Cornell Univ., Ithaca, N. Y.
Availability: Published in Journal of Financial and Quantitative Analysis, v11 n4 p339-64 Dec 1967.

Descriptors: (*Management planning, *Mathematical programming), (*Budgets, Management planning), (*Economics, Management planning), Decision theory, Probability, Uncertainty, Linear programming, Optimization, Sensitivity, Numerical methods and procedures, Mathematical models.
Identifiers: Chance-constrained programming, Capital budgeting.

The paper consists of explorations conducted around some of the possibilities that might be offered for capital budgeting via recently developed methods, e.g., chance-constrained programming, linear programming under uncertainty, etc. These explorations are not designed to be exhaustive and they are not conducted in the depth that is likely to be required for use on significant problems in management or economic planning. Nevertheless, the motivation underlying these developments is one that is directed to synthesizing alternatives that are more immediately operational than the ones that are likely to become available in the foreseeable future via the more customary routes of risk-utility equivalences.
AD-666 840 Not available from CFSTI.

SOME NEW APPROACHES TO RISK,
Carnegie Inst of Tech Pittsburgh Pa Management Sciences Research Group
R. Byrne, A. Charnes, W. W. Cooper, and K. Kortanek. 1 Jan 68, 22p
Contract Nonr-760 (24)
Prepared in cooperation with Northwestern Univ., Contract Nonr-1228 (10), Department of the Army, Contract DA-31-124-ARO (D)-322, and Cornell Univ., Ithaca, N. Y.
Availability: Published in The Accounting Review, v43 n1 p18-37 1 Jan 68.

Descriptors: (*Management planning, *Probability), (*Decision theory, Management planning), (*Mathematical programming, Management planning), Optimization, Stochastic processes, Linear programming, Response, Reviews.

Contents: A new product example of a stochastic decision tree; An approach via stochastic linear programming; Expected value choices and risk control constraints; Information assumptions and decision rules.
AD-666 841 Not available from CFSTI.

A STUDY OF THE MODAL PROPERTIES OF LINEAR DYNAMICAL SYSTEMS.
Technical rept.,
Texas Univ Austin Labs for Electronics and Related Science Research
Harold D. Albertson, and B. F. Womack. 31 Jan 68, 108p Rept no. TR-44
AFOSR-68-0290
Grant AF-AFOSR-766-67

Descriptors: (*Systems engineering, Control systems), (*Control systems, Mathematical models), Linear systems, Transfer functions, Matrix algebra, Stability, Algorithms.
Identifiers: Optimal control theory.

A study of various modal properties of linear, dynamical systems is carried out in this investigation. The problem of constructing minimum-state realizations of transfer function matrices is considered in detail. A solution to the problem of determining the minimum number of outputs required to observe all the dynamic modes of a system and the minimum number of inputs required to excite all system modes is presented. Algorithms for remov-

ing uncontrollable and unobservable state variables from time-variable as well as constant parameter systems are developed.
AD-666 899 HC$3.00 MF$0.65

ASYMPTOTICALLY OPTIMAL DISCRIMINANT FUNCTIONS FOR PATTERN RECOGNITION.
Technical rept.,
Texas Univ Austin Labs for Electronics and Related Science Research
Charles T. Wolverton, and Terry J. Wagner. 15 Feb 68, 49p Rept no. TR-45
AFOSR-68-0381
Grant AF-AFOSR-766-67

Descriptors: (*Pattern recognition, *Decision theory), Sampling, Random variables, Optimization, Probability, Approximation (Mathematics), Convergence, Information theory, Set theory, Algorithms, Adaptive systems, Classification, Theorems.
Identifiers: Discriminant functions.

The two category classification problem is considered. No a priori knowledge of the statistics of the classes is assumed. A sequence of labeled samples from the two classes is used to construct a sequence of approximations of a discriminant function which is optimum in the sense of minimizing the probability of misclassification but which requires knowledge of all the statistics of the classes. Depending on the assumptions made about the probability densities corresponding to the two classes, the integrated-square-error of the approximations converges in probability or with probability 1 to zero. The approximations are recursive and nonparametric. Rates of convergence are given. The approximations are used to define a decision procedure for classifying unlabeled samples. It is shown that as the number of labeled samples used to construct the approximations increases, the resulting sequence of discriminant functions is asymptotically optimal in the sense that the probability misclassification when using the approximations in the decision procedure converges in probability or with probability 1, depending on the assumptions made, to the probability misclassification of the optimum discriminant function. The results can be easily extended to the multicategory problem and to the case of an arbitrary Bayes risk (i.e., costs of misclassification not necessarily equal to 1). (Author)
AD-666 900 HC$3.00 MF$0.65

MATHEMATICAL FORMULATION: A PROBLEM IN DESIGN,
Rand Corp Santa Monica Calif
Lawrence J. Watters, A. Alan B. Pritsker, and Philip M. Wolfe. Feb 68, 22p Rept no. P-3790

Descriptors: (*Operations research, Scheduling), (*Production control, Scheduling), (*Scheduling, Optimization), Mathematical programming, Mathematical models, Problem solving, Costs.

The relationship between formulation and design is examined. The main aspects of mathematical formulation are the development of definitions of variables and the functional relationships of the variables required to model the situation under study. There are many ways to attack these two aspects since there can be many mathematical formulations for the same problem description. The design of an efficient mathematical formulation is an activity analogous to other engineering design activities. In this paper the design aspects of mathematical formulation are discussed and an example illustrating the design considerations is presented. (Author)
AD-666 902 HC$3.00 MF$0.65

THE CONNECTIVITY FUNCTION OF A GRAPH,
Michigan Univ Ann Arbor Dept of Mathematics
Lowell W. Beineke, and Frank Harary. Mar 68, 6p
AFOSR-68-0619
Grant AF-AFOSR-754-67
Availability: Published in Mathematika, n14 p197-202 1967.

Descriptors: (*Graphics, Networks), (*Transportation, Graphics), Vulnerability, Logistics, Optimization, Set theory, Theorems.
Identifiers: Connectivity functions.

The purpose of this note is to study the pairs (k,l) of non-negative integers satisfying minimality conditions for disconnecting a graph by the removal of k vertices and l edges. It is shown that there are few restrictions on the collections of such pairs associated with some graph. The theorem of Menger on connectivity is then extended to the mixed cases of vertices and edges. (Author)
AD-667 013 Not available from CFSTI.

THEORY AND APPLICATION OF OPTIMAL CONTROL FOR DISTRIBUTED PARAMETER SYSTEMS. I. THEORY,
California Univ Los Angeles Dept of Engineering
W. L. Brogan. Mar 68, 17p
AFOSR-68-0533
Grant AF-AFOSR-699-65
Prepared in cooperation with Aerospace Corp., El Segundo, Calif., Electronics Div.
Availability: Published in Automatica, v4 p107-20 1967.

Descriptors: (*Control systems, Optimization), (*Dynamic programming, Control systems), (*Boundary value problems, Problem solving), Operators (Mathematics), Partial differential equations, Matrix algebra, Hilbert space, Algorithms.
Identifiers: *Optimal control theory, Distributed parameter systems.

The theory of optimum control for distributed parameter systems is presented using a dynamic programming approach. These results have been previously presented, but the present two-part paper shows how an additional class of problems involving boundary control can be handled with the same theory. Use is made of the extended definition of the spatial operators involved. Also, a geometrical insight into the transversality conditions is presented. Algorithms for solving certain classes of problems are presented as well as numerical results obtained from them. The techniques used in these simple problems suggest methods that can be adapted to more complex ones. (Author)
AD-667 038 Not available from CFSTI.

THEORY AND APPLICATION OF OPTIMAL CONTROL FOR DISTRIBUTED PARAMETER SYSTEMS--II,
California Univ Los Angeles Dept of Engineering
W. L. Brogan. Mar 68, 19p
AFOSR-68-0544
Grant AF-AFOSR-0699-65
Prepared in cooperation with Aerospace Corp., El Segundo, Calif.
Availability: Published in Automatica, v4 p121-37 1967.

Descriptors: (*Operations research, Control), Optimization, Problem solving, Algorithms, Digital computers, Flow charting, Numerical methods and procedures, Linear systems, Partial differential equations, Integral equations.
Identifiers: *Control theory.

Solution algorithms and computational results are presented for several optimal control problems involving distributed parameter systems. The methods used are those developed in Part I of this paper. The problems treated are fairly simple ones but the same techniques can be applied to more general problems. The theory of optimal control for distributed parameter systems has been previously developed. Applications of the theory have received considerably less attention. It is hoped that the results presented in this paper will be useful in stimulating further applications. (Author)
AD-667 092 Not available from CFSTI.

A METHOD FOR THE DESIGN OF STABLE NONLINEAR FEEDBACK SYSTEMS,
Northwestern Univ Evanston Ill
For primary bibliographic entry see Field 9C.
AD-667 102 Not available from CFSTI.

GENERATING ASSOCIATED RANDOM VARIABLES,
Boeing Scientific Research Labs Seattle Wash Mathematics Research Lab
James D. Esary, and Frank Proschan. Jan 68, 21p Rept nos. D1-82-0696, Mathematical note-546

Descriptors: (*Operations research, *Reliability), (*Random variables, Stochastic processes), Statistical processes, Performance (Engineering), Maintenance, Mathematical models, Sequences, Queueing theory, Theorems.
Identifiers: *Associated random variables.

The paper defines associated random variables and applies results to reliability models involving various types of maintenance.
AD-667 169 HC$3.00 MF$0.65

A PROPOSED METHOD OF ESTIMATING CLOUD-TOP TEMPERATURE, CLOUD COVERS, EMISSIVITY, AND CLOUDNESS FROM SHORT- AND LONG WAVE RADIATION DATA OBTAINED BY MEDIUM-RESOLUTION SCANNING RADIOMETERS,
Chicago Univ., Ill. Satellite and Mesometeorology Research Project.
For primary bibliographic entry see Field 4B.
PB-177 752 HC$3.00 MF$0.65

13. MECHANICAL, INDUSTRIAL, CIVIL, AND MARINE ENGINEERING

13A. Air Conditioning, Heating, Lighting, and Ventilating

COOLDOWN TIME FOR SIMPLE CRYOGENIC PIPELINES.
National Bureau of Standards, Boulder, Colo. Cryogenics Div.
For primary bibliographic entry see Field 20M.
For abstract, see STAR 06 09.
N68-19314 HC$3.00 MF$0.65

THE ESTIMATION OF HEAT OUTPUTS FOR ROAD HEATING INSTALLATIONS,
Road Research Lab., Crowthorne (England).
For primary bibliographic entry see Field 13B.
PB-177 713 HC$3.00 MF$0.65

COMBUSTION OF RESIDUAL FUEL WITH MASSIVE RECIRCULATION,
IIT Research Inst., Chicago, Ill.
Imants Reba. Aug 67, 102p IITRI-M6120
Contract MA-3817

Descriptors: (*Oil burners, Corrosion inhibition), Fuel contamination, Vanadium compounds, Sodium compounds, Models (Simulations), Combustion chambers, Test methods, Test equipment, Stainless steel, Coanda effect, Subsonic flow, Fuel additives, Fuel oils, Correlation techniques, Sulfur compounds, Combustion products, Fouling.
Identifiers: Recirculation, Coanda nozzles, Entrained flow, Residual fuels.

Metal surfaces exposed to combustion gases from residual fuels suffer from fouling and severe corrosion. The study introduces a method based primarily on improved burner technology, specifically, combustion with massive, external recirculation. Short (10 hr) and long (30 hr) exposure time tests have demonstrated that combustion of untreated oil, having high vanadium and sodium content but

with sufficiently large recirculation produces corrosion of essentially the same magnitude as that experienced from the combustion of diesel fuel without recirculation. Use of the Coanda effect to attain massive recirculation rates in practical burner application is considered. A number of side effects on combustion associated with recirculation are described. (Author)
PB-177 747 HC$3.00 MF$0.65

13B. Civil Engineering

A DYNAMIC MODEL OF URBAN STRUCTURE,
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 5C.
AD-666 655 HC$3.00 MF$0.65

DIRECT SPECTROPHOTOMETRIC ANALYSIS OF AMMONIA IN NATURAL WATERS BY THE PHENOL-HYPOCHLORITE REACTION.
Naval Ship Research and Development Center Annapolis Md Annapolis Div
For primary bibliographic entry see Field 7B.
AD-666 959 HC$3.00 MF$0.65

TALC IN ATMOSPHERIC DUSTS,
Scripps Institution of Oceanography La Jolla Calif
H. Windom, J. Griffin, and E. D. Goldberg. Mar 68, 5p
Contract Nonr-2216 (23)
Availability: Published in Environmental Science and Technology, v1 p923-6 Nov 1967.

Descriptors: (*Air pollution, *Talc), Sampling, Dust, Rain, Snow, Pesticides, X-ray diffraction analysis, Solids, Particle size, Glaciers, Dissemination, Agriculture.

The mineral talc has been observed in dusts recovered directly from the atmosphere and in the solid mineral phases of rain and snow. The talc, where detected, attains levels of the order of a per cent by weight in the solid phases. This talc probably arises from agricultural activity where the mineral is used as a carrier and diluent for pesticides. The amounts of talc found in atmospheric dusts appear to reflect a local introduction rather than a generalized global fallout. (Author)
AD-667 167 Not available from CFSTI.

ESTABLISHMENT OF ROADSIDE VEGETATION FOR ARIZONA HIGHWAYS.
Final rept.,
Arizona Univ., Tucson. Dept. of Horticulture.
Frank D. Cole. 30 Jun 67, 57p
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Roads, Plants (Botany)), (*Plants (Botany), Deserts), Propagation, Preparation, Selection, Culture, Erosion, Trees, Shrubs, Grasses, Plant hormones (Growth substances), Seeds, Climatology, Desert tests, Drainage, Additives, Gravel, Fertilizers, Test methods, Survival.
Identifiers: Roadside landscaping, Mulches.

The report lists and, in fact, describes species of native woody and herbaceous plants and have a potential for roadside use in the arid regions of the Southwest. Included are descriptions of techniques useful in effectively propagating and establishing many of the species named by direct seeding and asexually. Seed collection dates, treatment and cultural practices are indicated for a number of species. Soaking Mexican Palo Verde seed in boiling water prior to direct seeding contributed to 70 percent germination. The use of pea-gravel and crushed cinders were found to be effective additives in material used for backfilling plant holes, probably for the reason that water percolated more freely. Composted gin-trash mixed with soil was as good as peat moss-manure mixture when used as backfill in plant holes. Where the use of equipment is feasible, it is desirable to scarify the surface prior to seeding grass. Tests demonstrated that plant growth and survival were benefitted by heavy pruning, watering, fertilization and the use of anti-desiccants. Mulches of straw and straw/asphalt were more effective than knit-net, soil-set, troy-turf and strandex in controlling erosion and stimulating grass growth. (BPR Abstract)
PB-177 036 HC$3.00 MF$0.65

HIGHWAY SEVERANCE STUDY NUMBER 9, WESTERN KENTUCKY PARKWAY, ELIZABETHTOWN TO LEITCHFIELD, HARDIN COUNTY, GRAYSON COUNTY.
Kentucky Dept. of Highways. Div. of Right of Way.
Aug 66, 164p
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Roads, Kentucky), (*Construction, Damage assessment), Rural areas, Natural resources, Money, Sociometrics, Economics, Terrain.
Identifiers: Property severance, Eminent domain, Right-of-ways.

The primary objectives of the study were: to analyze the general effects of interstate right-of-way acquisition on adjoining farmland, and to note the economic effects as reflected by the purchase and sales of property adjoining the right-of-way subsequent to the taking. The study area selected provided a cross section of farms in various states of cultivation, including potentially highly productive land to very marginal farmland. (BPR Abstract)
PB-177 149 HC$3.00 MF$0.65

INFLUENCE OF A MAJOR HIGHWAY IMPROVEMENT ON AN AGRICULTURALLY-BASED ECONOMY: CASE STUDY OF THE IMPACT OF INTERSTATE 94 ON THE ECONOMY OF DUNN AND ST. CROIX COUNTIES, STATE OF WISCONSIN,
Wisconsin Univ., Madison. Bureau of Business Research.
William H. Dodge. 1967, 172p
Prepared in cooperation with Bureau of Public Roads, Washington, D. C. Pub. in Wisconsin Commerce Papers, v3 n2 Aug 1967.

Descriptors: (*Transportation, Rural areas), (*Roads, Rural areas), Economics, Traffic, Commerce, Money, Statistical analysis, Growth, Wisconsin, Employment, Effectiveness, Agriculture.
Identifiers: Interstate highways, St. Croix (Wisconsin).

The report presents the research findings of the effects upon the agricultural and trade economy in the corridor through Dunn and St. Croix Counties, Wisconsin of the construction of a major highway improvement--I-94. The study looks at the area as a whole and attempts to discover gradations of change within the total study area of the two counties. Conclusions reached in this report were very general. It appears that this study was attempted too soon after the 'before' study, and that it will take longer than the three to five years in this study to identify material changes in various aspects of the agricultural and trade economy. Benefits to long-haul traffic, to local residents with longer trips, and to users of the parallel route, U. S. 12, by the relief of congestion on this route were found. These benefits, such as lowered operating costs because of the new highway, do not manifest themselves in higher farm real estate values. The relief of congestion has spurred land reclassification, especially near larger communities. The researchers conclude that as the reclassification of land creates newer and more productive uses for land and as business establishments in the area orient to new highway and traffic conditions substantial impact will be felt on income and gross product. (BPR Abstract)
PB-177 155 HC$3.00 MF$0.65

THE EFFECT OF FREEWAYS ON NEIGHBORHOOD: AN ANALYSIS OF THE RELATIONSHIP OF MOBILITY TO COMMUNITY VALUES,
California State Div. of Highways.
Stuart L. Hill. Jun 67, 99p
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Urban areas, *Roads), (*Urban planning, *Economics), Analysis, Money, Roads, Urban areas, Buildings, Housing, Housing projects, Mobility, Site selection, California.
Identifiers: Property values, Freeways, Mobility Index.

A Mobility Index based on (1) the percentage of persons in the same household in 1960 and 1955, (2) percentage of home ownership, and (3) the percentage of single family residences has been used to evaluate highway effects in several California communities. Tentative findings are that in a fairly stable community--Sacramento--a freeway constructed along neighborhood boundaries had no effect upon the Mobility Index. In newer suburbs--La Mesa and Lemon Grove--there was a tendency for the area immediately adjacent to the freeway to become more mobile, i.e., for a reduction of Mobility Index, because of the construction of multiple units on vacant land, while the rest of the neighborhoods, generally, became more stable as more and more of their residents attain 5-year tenancy. In Long Beach, a freeway did not increase the rate of change in a stable neighborhood; in a more unstable neighborhood, the area next to a freeway may experience a more significant change. In Seattle, the most stable area became more stable while the mixed sections changed little. The author concludes that the effect of a freeway built along the boundaries of a neighborhood will vary somewhat with the previous propensity of that neighborhood. (BPR Abstract)
PB-177 343 HC$3.00 MF$0.65

APPLICATION OF AASHO ROAD TEST RESULTS TO DESIGN OF FLEXIBLE PAVEMENTS IN MINNESOTA.
Minnesota Univ., Minneapolis. Dept. of Civil Engineering.
13 Mar 67, 61p NHD-Investigation-183, SR-3

Descriptors: (*Pavements, Loading (Mechanics)), Design, Thickness, Roads, Life expectancy, Analysis, Test methods, Cargo vehicles, Computer programs, Weight, Volume, Traffic, Trafficability, Periodic variations, Minnesota.

The objectives of the research reported are (1) to develop a method for estimating the total equivalent 18,000-lb. single-axle loads to which each study test section has been subjected (2) to determine the traffic parameters that will best predict future loadings, and (3) to develop a procedure for estimating axle-load growth. A traffic study involving collection of vehicle weight, classification and volume data, for each of 50 widely distributed test sections, was conducted in 1964. Using these data, together with data from routine annual statewide truck weight studies, the total traffic loadings on each test section during each year of life are computed. In addition, correlations are made between equivalent 18,000-lb. single axle loads and (1) average daily traffic (2) heavy commercial average daily traffic and (3) total 4- and 5-axle vehicles. Computer programs are presented for (1) determining truck weight factors for each vehicle type and (2) calculating total annual traffic loadings on each test section. (Author)
PB-177 375 HC$3.00 MF$0.65

EVALUATION SYSTEM FOR COMMUNITY ACTION PROGRAMS. PHASES I-III.
Technical rept.
Basic Systems Inc., New York.
10 Sep 65, 41p
Contract OEO-482

Descriptors: (*Urban planning, Sociometrics), Population, Statistical analysis, Distribution,

Money, Education, Housing, Physical fitness, Delinquency, Criminology, Hospitals, Recreation, Religion, Group dynamics, Attitudes, Sampling, Response, Feasibility studies, District of Columbia, Questionnaires.
Identifiers: Area planning and development, Community action programs.

The report describes the procedure leading to final information requirements for an evaluation system of community action programs. This procedure involved: consideration of the goals, the character of the community to be studied, the program elements operating within the community to be studied, possible sampling strategies as well as considerations of time, cost and feasibility. Crucial in the development of the system was frequent consultation with the Bureau of the Census to determine the content and scope of the questionnaire. (Author)
PB-177 428 HC$3.00 MF$0.65

SKID RESISTANCE OF BITUMINOUS SURFACES.
Interim rept.,
New York State Dept. of Transportation, Albany.
W. C. Burnett, J. L. Gibson, and E. J. Kearney.
Oct 67, 23p Physical RR-67-3
Prepared in cooperation with U. S. Bureau of Public Roads.

Descriptors: (*Pavements, Skidding), Friction, Wear resistance, Surface roughness, Bituminous coatings, Grain size, Materials, Traffic, Trafficability, Test equipment, Test facilities, Test methods, Hardness, New York.
Identifiers: Wet surfaces, Skid resistance.

A drag force trailer with controlled braking of one wheel was used to measure the coefficient of friction of wet bituminous surfaces. Nearly all crushed stone aggregates used in the State were included in surfaces measured. A technique for measuring the skid resistance of bituminous surfaces constructed in the laboratory and subject to artificially induced traffic wear was tried but was not successful. Analysis of data indicated that a coefficient of friction above 0.32 could be assured if the aggregate retained on the 1/4 inch sieve for 1A mixes (bituminous concrete) or the aggregate retained on the 1/8 inch sieve for 1A-C and 2A mixes (sheet asphalts) contains more than 12 percent hard minerals either as impurities in softer aggregates or as individual stones. An acid leaching technique was used to determine the percentage of hard impurities in limestone and dolomite aggregate. (BPR Abstract)
PB-177 481 HC$3.00 MF$0.65

ANALYSIS OF VOLUME CHANGE TEST OF PORTLAND CEMENT MORTAR.
California State Div. of Highways. Materials and Research Dept.
For primary bibliographic entry see Field 11D.
PB-177 536 HC$3.00 MF$0.65

OZARKS REGION HIGHWAY PLANNING STUDY.
Preston (E. S.) and Associates Ltd., Columbus, Ohio.
Feb 68, 106p
Prepared in cooperation with the Economic Development Administration, Washington, D. C.

Descriptors: (*Roads, Rural areas), Transportation, Resources, Economics, Water supplies, Water, Water traffic, Navigation, Airports, Costs, Employment, Recreation, Kansas, Missouri, Oklahoma, Arkansas, Population.
Identifiers: Ozarks, Area planning and development.

Contents: The economy of the region; The highway system in the Ozarks region; Recommended Ozarks highway programs; National airport plan (Fiscal year 1968-1972; and Justification and tabulations for the initial Ozarks highway projects.
PB-177 574 HC$3.00 MF$0.65

RESIDENTIAL LOCATION AND URBAN MOBILITY,
Michigan Univ., Ann Arbor. Survey Research Center.
John B. Lansing, Eva Mueller, and Nancy Barth.
Jun 64, 149p

Descriptors: (*Urban areas, *Transportation), (*Manpower studies, Decision making), Distribution, Mobility, Sampling, Statistical analysis, Density, Costs, Factor analysis, Public opinion, Questionaires, Errors, Urban planning.
Identifiers: Commuters, Area planning and development.

Since the close of World War II rapid changes have been taking place both in the geographic organization of cities and in urban transportation. These changes present a series of problems to public officials, especially to those concerned with the planning of transportation facilities. The objective of the research reported here is to make a contribution to the solution of some of these problems by means of an indirect approach. The focus is not on specific administrative problems nor on the preparation of forecasts but on the study of the forces at work affecting urban growth and urban transportation. (Author)
PB-177 693 HC$3.00 MF$0.65

A STUDY OF THE EFFECTS OF FREEWAYS ON CENTRAL BUSINESS DISTRICTS,
Clark Univ., Worcester, Mass. Graduate School of Geography.
Robert J. Huhtanen, Paul J. Mika, Richard E. Preston, and Raymond E. Murphy. Feb 61, 154p
Contract CPR-11-7829

Descriptors: (*Roads, Urban areas), (*Economics, Roads), Commerce, Volume, Traffic, Money, Terrain, Intensity, Employment, Population, Statistical data, Maps, Tables, California, Virginia, Urban planning.
Identifiers: Freeways, Urban planning and development.

The report represents the findings of a study of the effects of freeways on central business districts in Richmond, Virginia; Long Beach, California; and Oakland, California. (Author)
PB-177 697 HC$3.00 MF$0.65

CLIFTON-HIGHLINE CANAL EXPERIMENTAL PROJECT I 70-1 (14)33,
Colorado State Dept. of Highways. Planning and Research Div.
For primary bibliographic entry see Field 8M.
PB-177 698 HC$3.00 MF$0.65

PROJECT DEFINITION PHASE STUDY FOR THE NATIONAL TRAFFIC SAFETY DOCUMENTATION CENTER.
Interim rept.
General Electric Co., Santa Barbara, Calif. TEMPO.
Dec 67, 160p 67TMP-121
Contract FH-11-6548

Descriptors: (*Roads, Traffic), (*Traffic, *Documentation), Information centers, Feasibility studies, Management planning, Urban areas, Urban planning, Human engineering, Safety.
Identifiers: Area planning and development, Interviews.

This report presents the study results of the first two tasks of the National Traffic Safety Documentation Center - Project Definition Phase program. These tasks are: Task A -- Study existing and potential users and their present and expected future needs for information. Define the existing and potential users of the Center, the purposes for which the Center will be used by each user group, and the needs which should be satisfied by the operation of the Documentation Center. Task B -- Study existing procedures for acquiring, storing, retrieving and disseminating documentary material on highway safety and related materials. Determine strengths and dificiencies of the existing procedures for obtaining information. (Author)
PB-177 702 HC$3.00 MF$0.65

DOCUMENTATION CENTER, VOLUME I.
Interim rept.
Michigan Univ., Ann Arbor. Highway Safety Research Inst.
1 Mar 68, 89p RFP-159-Vol-1
Contract FH-11-6689

Descriptors: (*Roads, Safety), (*Safety, *Documentation), Information retrieval, Feasibility studies, Catalogs, Handbooks, Instruction manuals, Periodicals, Newspapers, Reports, Collecting methods, Storage, Analysis, Dissemination, Networks, Automation.

The first section of the document determines the answers to three questions through a user study; Who are the potential users. What are their information and documentation requirements. Which of these needs should be fulfilled. The second section deals with procedures used or available for the acquisition, storage, retrieval, and dissemination of highway safety information and their strengths and deficiencies. Procedures for selection, acquisition, cataloging, subject analysis and indexing, machine indexing and retrieval, and document storage and retrieval are discussed. (Author)
PB-177 703

INFORMATION NEEDS: THE INTERSTATE HIGHWAY MOTORIST IN IOWA,
Little (Arthur D.), Inc., Cambridge, Mass.
For primary bibliographic entry see Field 5A.
PB-177 708 HC$3.00 MF$0.65

A LABORATORY INVESTIGATION OF THE PHYSICAL AND CHEMICAL PROPERTIES OF BURNT COLLIERY SHALE,
Road Research Lab., Crowthorne (England).
For primary bibliographic entry see Field 8M.
PB-177 710 HC$3.00 MF$0.65

EARTHWORKS IN SOFT CHALK: A STUDY OF SOME OF THE FACTORS AFFECTING CONSTRUCTION,
Road Research Lab., Crowthorne (England).
For primary bibliographic entry see Field 8M.
PB-177 711 HC$3.00 MF$0.65

ROADSTONE TESTS ON PRESENT DAY BLAST-FURNACE SLAG,
Road Research Lab., Crowthorne (England).
J. R. Hosking. 1967, 28p RRL-LR96

Descriptors: (*Roads, *Construction materials), (*Slags, Physical properties), Weight, Density, Mechanical properties, Classification, Statistical analysis, Sampling, Tables, Great Britain, Processing, Wastes (Industrial), Production, Test methods, Blast furnaces.
Identifiers: Blast-furnace slag.

The report describes an investigation carried out into the properties of blast-furnace slag from ten works representative of present-day production. The work forms part of a programme of research which is being carried out by the Road Research Laboratory in collaboration with the British Slag Federation to determine the best procedures for using the increasing quantities of slag, including slag of low density, at present being produced. The need for the research arose as a result of the present-day increase in production of lighter-weight slag, which has followed changes in blast-furnace

practice. These changes include the increasing use of high-grade imported iron ores and the adoption of a more direct method of cooling the slag. (Author)
PB-177 712 HC$3.00 MF$0.65

THE ESTIMATION OF HEAT OUTPUTS FOR ROAD HEATING INSTALLATIONS,
Road Research Lab., Crowthorne (England).
P. J. Williamson. 1967, 71p RRL-LR77

Descriptors: (*Pavements, Heat transfer), (*Roads, Heaters), Cold weather tests, Thermal radiation, Heat flux, Convection (Heat transfer), Heat transfer coefficients, Mathematical analysis, Diffusion, Wind, Melting, Ice, Snow, Surface properties, Cooling, Heating elements, Cloud cover, Surface temperatures, Evaporation, Correlation techniques, Great Britain.
Identifiers: Elevated roads, Road heating, Heat losses.

Heat transfer coefficients relating heat losses from surfaces of heated roads to wind speed and the difference between air and surface temperatures have been derived from measurements made during icy conditions. The magnitude of the heat flow downwards from the heating grid is discussed and a method of calculating the extra heat output required for installations on elevated roads is given. Solutions of the equation of heat flow in a semi-infinite medium under simple boundary heat flux conditions are used to illustrate the effect of heater depth and output on the rate of response, snow melting capacity and thermal storage of the system. Operating conditions required to provide adequate thermal storage in off-peak installations are examined in the light of this analysis and the observed heat losses from existing installations, and heater outputs required in different situations are estimated both for continuously available supply and for off-peak supply. (Author)
PB-177 713 HC$3.00 MF$0.65

STUDIES OF THE KEUPER MARL PHYSICAL PROPERTIES,
Road Research Lab., Crowthorne (England).
For primary bibliographic entry see Field 8M.
PB-177 714 HC$3.00 MF$0.65

SUB-SOIL DRAINAGE AND THE STRUCTURAL DESIGN OF ROADS,
Road Research Lab., Crowthorne (England).
For primary bibliographic entry see Field 8L.
PB-177 715 HC$3.00 MF$0.65

INTENSIVE BITUMINOUS PAVING TRIAL ON THE WARWICK BY-PASS,
Road Research Lab., Crowthorne (England).
K. Booth, and P. J. F. Wingate. 1967, 25p RRL-LR121

Descriptors: (*Pavements, Construction), (*Machines, Bituminous coatings), Roads, Velocity, Production, Costs, Handling, Transportation, Test methods, Great Britain, Performance (Engineering), Efficiency, Cargo vehicles, Spark ignition engines.

This report describes a bituminous paving trial to study the problem likely to be encountered while working at a high rate or output on a motorway type contract and to ascertain the capacity and limitations of the Blaw Knox PF. 90 'M' Type Paver. The report examines the effect of different engine speeds and gears on output and on stoppages to the forward movement of the paver, and of the performance of different types of lorry on output. The report concludes that paving rates in the order of 240 ton/h are practical provided good control of all operations is exercised and there be freedom from obstructions to continuous paving; that the paver would have adequate capacity for rates up to 300 ton/h, provided the hopper capacity could be increased and that quality need not suffer at high rates of working. (Author)
PB-177 716 HC$3.00 MF$0.65

THE D.A.V. AND BLOCKED-OUT BEAM CRASH BARRIERS,
Road Research Lab., Crowthorne (England).
V. J. Jehu. 1967, 21p RRL-LR104

Descriptors: (*Roads, Structures), (*Motor vehicle accidents, Safety), Design, Reinforced concrete, Protection, Impact tests, Deceleration, Anchors (Structural), Damage, Great Britain.
Identifiers: Crash barriers.

Cars weighing 3000 lb were driven against the concrete beam crash barrier with increasing severity of impact; for an impact of 31 mile/h and 20 deg the vehicle rolled towards the barrier sufficiently for the wheels remote from the barrier to be lifted clear of the road for a short time. For a more severe impact at 46 mile/h and 19.5 deg, in which the mean lateral vehicle deceleration was 2.9 g, the induced rolling motion continued after the vehicle left the barrier, and it eventually overturned. The curved face of the concrete guardrail extended from 10 in to 22 in above ground, the lower edge making first contact with the vehicles, whose centres of gravity were 24 in above ground. In similar tests with a double-sided steel beam barrier, with guard rails blocked out to give a 9 in clearance between the beam and the central support posts the car was reflected, without noticeable rolling action towards the barrier, up to an impact at 50 mile/h and 18 deg. The mean lateral vehicle deceleration was 2.5 g. The steel guard rail extended from 15 in to 27 in above ground, and therefore, operated at the height of the centre gravity of the car. (Author)
PB-177 721 HC$3.00 MF$0.65

THE WIRE-ROPE SLOTTED-POST CRASH BARRIER,
Road Research Lab., Crowthorne (England).
V. J. Jehu, and I. B. Laker. 1967, 48p RRL-LR127

Descriptors: (*Roads, Structures), (*Motor vehicle accidents, Safety), Design, Protection, Deflection, Wire, Anchors (Structural), Cables (Mechanical), Velocity, Impact tests, Steel, Great Britain.
Identifiers: Crash barriers.

An efficient form of crash barrier developed by the Road Research Laboratory involves the use of tensioned horizontal members carried on relatively weak vertical supports. The report describes a series of tests carried out on wire rope barriers of this type in order to select the most suitable detailed design. Twenty-eight dynamic tests were carried out on alternative designs of barrier in which the ropes rested in vertical slots cut into the tops of weak I-section mild steel posts. Most of the tests were carried out with cars weighing 3000 lb, but in some tests concerned with optimum rope heights small vehicles and tall vehicles were used. Impact speeds ranged from 17 to 67 mile/h at nominal angles to the line of the barrier of 10 deg. and 20 deg. (Author)
PB-177 723 HC$3.00 MF$0.65

BASE STABILIZATION WITH CUT-BACK ASPHALT AND CHLORIDES - NOBLES COUNTY.
Final rept.,
Minnesota Dept. of Highways.
G. R. Korfhage. 1967, 42p
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Roads, Pavements), Chlorides, Asphalt, Construction, Performance (Engineering), Loading (Mechanics), Density, Tests, Minnesota, Test methods.
Identifiers: Stabilized aggregates.

The report describes the construction and evaluation of a test road in Nobles Co., Minnesota. The test road was divided into six experimental sections, each approximately one mile long. Sections 1 and 2 featured a 1 1/2 inch aggregate base course stabilized with MC-2 cut-back asphalt; section 3 had a 3 inch Na Cl stabilized aggregate base; section 4 had 3 inch Ca Cl2 stabilized aggregate base; section 5 featured a 3 inch untreated base with the bottom 3 inch of the 5 inch sand-gravel subbase stabilized with Ca Cl2; section 6 was untreated control (3 inch aggregate base with 5 inch sand-gravel subbase). The performance of the sections was evaluated by plate bearing, Benkelman beam, moisture-density and chloride content test and visual observations. The author concludes that no benefits resulted from the addition of chlorides to the base or subbase as they began migrating out of the granular layers a few months after construction. The sections with 1 1/2 inch MC-2 cut-back asphalt treated base performed about as well as the control sections with 3 inches of untreated base. (BPR Abstract)
PB-177 744 HC$3.00 MF$0.65

MINERAL WEAR IN RELATION TO PAVEMENT SLIPPERINESS,
Pennsylvania State Univ., University Park. Dept. of Mechanical Engineering.
Kent Stiffer. Nov 67, 99p Joint Road Friction-15

Descriptors: (*Pavements, Friction), (*Minerals, Physical properties), Wear resistance, Temperature, Adhesion, Strain (Mechanics), Materials, Oxidation, Melting, Chemistry, Stresses, Hardness, Test equipment, Test methods, Pennsylvania.
Identifiers: Pavement slipperiness.

Significant progress with respect to the complex problems of the determination of which properties of minerals relate to their wear resistance and how minerals wear is reported. It was established that hardness is the single most important characteristic which controls aggregate wear. Also, minerals are worn by soft abrasives, and that in this case the balance between strain and surface energies may be governing. Although the mechanism of mineral wear is still far from fully describable, a result of this research is to identify an important difference between the wear of metals and minerals. Metals are scratched by the abrasive, while minerals are scratched and pitted. The author suggests additional vital areas of future research to further the understanding of changes in pavement slipperiness due to wear. (BPR abstract)
PB-177 754 HC$3.00 MF$0.65

MANAGEMENT RESEARCH STUDY FOR THE DELAWARE STATE HIGHWAY DEPARTMENT. VOLUME I.
Management Technology, Inc., Washington, D. C.
Dec 67, 128p

Descriptors: (*Management planning, Roads), (*Management control systems, Delaware), Systems engineering, Operation, Substitutes, Effectiveness, Construction, Costs, Personnel management, Federal budgets.

The study reviews the administration and operation of the Delaware state highway department. Alternate organizational structures and administrative procedures are proposed that would, if implemented, improve the effectiveness and efficiency of the department. Some of the major areas of investigation include legislation under which the department operates, analysis of the existing organizational structure and management control it affords, budget and financial procedures, personnel management, long-range planning and coordination of the department's operations, and relationships with other state agencies. (BPR Abstract)
PB-177 758 HC$3.00 MF$0.65

LOAD CARRYING CAPACITY OF MINNESOTA SECONDARY FLEXIBLE PAVEMENTS.
Final rept.,
Minnesota Univ., Minneapolis. Dept. of Civil Engineering.
Eugene L. Skok, Jr. 30 Jun 67, 106p MHD-Investigation-603
Availability: Original document in color until exhausted.

Descriptors: (*Roads, Pavements), (*Pavements, Loading (Mechanics)), Test methods, Test equipment, Structural properties, Analysis, Strength, Statistical data, Deflection, Plasticity, Soils, Sampling, Minnesota.
Identifiers: Bearing tests, Benkelman-beam deflection tests.

The load carrying capacities of highways in Minnesota have been evaluated by a plate bearing test procedure for 16 years. Many counties and municipalities are interested in strength information on their roads and streets to establish spring load restrictions and to evaluate their design strengths. However, the plate bearing test requires a special trailer, the total cost of which is such that it is not feasible for most counties to acquire it. The purpose of this investigation is to study the Benkelman Beam test, another method of evaluating road strength, and to relate the results obtained to those of the plate bearing test. Field measurements were made over a period of 7 years. Basically the data consist of plate bearing test results and Benkelman Beam deflection measurements, along with information on the pavement structures and subgrade soils. The Benkelman Beam deflections are used to evaluate the pavement strengths in two ways. One way correlates the deflections and the plate bearing values and obtains the allowable tonnage capacity of the pavement through previously established tonnage-plate bearing value relationships. Another method establishes the allowable spring tonnage directly with the Benkelman Beam deflection test. (BPR Abstract)
PB-177 759 HC$3.00 MF$0.65

AN ATTEMPT TO MEASURE OBJECTIVELY THE QUALITY OF AIR.
National Swedish Inst. for Building Research, Stockholm (Sweden).

1967, 42p Rept. no. 34:1967
Also available from The National Swedish Institute for Building Research, Box 27 163, Stockholm 27, Pris Kronor 12:-.

Descriptors: (*Air, Contamination), (*Air pollution, Measurement), Analysis, Analysis of variance, Sensory perception, Odors, Impurities, Reliability, Detectors, Gas chromatography, Ventilation, Recording systems, Human engineering, Cooling + ventilating equipment. Theses, Smell, Thresholds (Physiology).

The results of the tests of validity, precision, reliability and correlation indicate that gas chromatographic analysis can be used for the objective measurement of air quality. It records not only the great differences of quality between malodorous air and fresh air, but also provides a criterion for the air pollution which takes place during a lecture hour in an insufficiently ventilated assembly room. The objective measurement is in the form of a non-dimensional quantity which designates the relation between the surfaces under air spectra for polluted and for fresh air. The best evaluation has been obtained with a K-column analysed to peak No. 4, which gives the number 4 for very bad air and the number 2 for stale air. It must be pointed out, however, that this conclusion is based upon a number of uncertainties. Before the method can be deemed to be fully tried out, a better statistical basis must be found by a large number of further tests. The correlation to subjective judgement has been made by a simple estimate of the air quality. This includes an uncertainty, because the test subject cannot make comparisons in pairs with clearly defined reference samples and different dilution of the sample air. This means that the quality could only be divided into the three very rough categories: fresh, stale and very bad air. The method also gives a criterion only for the immediate reaction upon the quality of the air. The phenomena which appear after remaining in the air for a certain time, such as headache and tiredness, do not enter into the judgement. (Author)
PB-177 763 HC$3.00 MF$0.65

PROJECTION OF APPLICATIONS AND NATIONAL BENEFITS OF A NEW RAPID EXCAVATION TECHNOLOGY.
Operations Research, Inc., Silver Spring, Md.
For primary bibliographic entry see Field 81.
PB-177 784 HC$3.00 MF$0.65

13C. Construction Equipment, Materials, and Supplies

ANALYSIS OF VOLUME CHANGE TEST OF PORTLAND CEMENT MORTAR.
California State Div. of Highways. Materials and Research Dept.
For primary bibliographic entry see Field 11D.
PB-177 536 HC$3.00 MF$0.65

ROADSTONE TESTS ON PRESENT DAY BLASTFURNACE SLAG,
Road Research Lab., Crowthorne (England).
For primary bibliographic entry see Field 13B.
PB-177 712 HC$3.00 MF$0.65

THE DAMPING PROPERTIES OF PLAIN CONCRETE: EFFECT OF COMPOSITION AND RELATIONS WITH ELASTICITY AND STRENGTH,
Road Research Lab., Crowthorne (England).
For primary bibliographic entry see Field 11B.
PB-177 719 HC$3.00 MF$0.65

13D. Containers and Packaging

INTERIOR COATING SYSTEMS FOR SURFACES IN CONTACT WITH PETROLEUM FUELS.
Office of the Director of Defense Research and Engineering Washington D C
For primary bibliographic entry see Field 11B.
AD-666 969 HC$3.00 MF$0.65

INVESTIGATION OF MOTOR VEHICLE PERFORMANCE STANDARDS FOR FUEL TANK PROTECTION. VOLUME I.
Fairchild Hiller Corp., Farmingdale, N. Y.
For primary bibliographic entry see Field 13F.
PB-177 690 HC$3.00 MF$0.65

13E. Couplings, Fittings, Fasteners, and Joints

TESTS OF BOLTED BUTT SPLICES,
Lehigh Univ., Bethlehem, Pa. Fritz Engineering Lab.
John W. Fisher, and Geoffrey L. Kulak. Dec 67, 27p 317.11

Descriptors: (*Bolted joints, Steel), Shear stresses, Flexural strength, Mechanical fasteners, Tensile properties, Bolts, Strain gages, Tests.

The results of experimental studies of constructional alloy (A514) steel butt splice fastened by A490 bolts are reported. Also included are results of experimental work on hybrid joints. This includes A36 - A440 steel joints and A440 - A514 steel joints fastened by A325 bolts as well as a A440 - A514 steel joint fastened by A490 bolts. The joint tests are compared with predicted results. It is shown that the previously developed theoretical work and analytical studies are verified. Good agreement is obtained for ultimate strength and the distribution of load among the fasteners. The study has also shown that the slip coefficient of grit blasted steel faying surfaces is about 0.34. The use of higher allowable shear stresses for A325 and A490 bolts in bearing-type connectors is found appropriate for both types of joints. (BPR Abstract)
PB-177 699 HC$3.00 MF$0.65

13F. Ground Transportation Equipment

HIGH-SPEED INDUCTION MOTOR SIMULATION.
Army Mobility Equipment Research and Development Center Fort Belvoir Va
For primary bibliographic entry see Field 21C.
AD-666 762 HC$3.00 MF$0.65

FUEL CELL-ELECTRIC PROPULSION TEST RIG (MODIFIED M-37, 3/4-TON CARGO TRUCK).
Army Mobility Equipment Research and Development Center Fort Belvoir Va
For primary bibliographic entry see Field 10B.
AD-666 763 HC$3.00 MF$0.65

POWER SOURCES FOR ELECTRIC CARS.
Army Electronics Command Fort Monmouth N J
For primary bibliographic entry see Field 10B.
AD-666 773 HC$3.00 MF$0.65

TWO-WAY RADIO COMMUNICATION MASS TRANSPORTATION DEMONSTRATION PROJECT.
Final rept.
New York City Transit Authority.
1968, 96p
Contract H-638

Descriptors: (*Railroads, *Radio communication systems), Transmitter-receivers, Feasibility studies, Voice communication systems, Radio equipment, Operators (Personnel), Police, Railroad cars, Statistical analysis, Mobile, Engineering, Tables, New York, Portable, Power supplies, Operation, Maintainability, Costs.
Identifiers: Rapid transit systems, New York City.

In its search for a better medium, this Authority specified two-way communication that would be equally effective in either direction and applicable to all of its activities. The train-to-wayside systems in Chicago, Toronto and London were too limited in scope for New York. A portable transistor radio, light enough to be carried, yet powerful enough to transmit and receive in the underground tunnels, was considered ideal. The development of miniaturized transistor components made this approach feasible, subject to the solution of technical problems. The purpose of the project was to demonstrate the effectiveness of such systems in improving the reliability of operation, reducing the number and duration of delays, providing public information, and improving policing and passenger safety. (Author)
PB-177 048 HC$3.00 MF$0.65

STUDIES IN TRAVEL DEMAND. VOLUME III.
Mathematica, Princeton, N. J.
Jul 67, 416p
Contract C-187-66
See also Volume 2, PB-176 114.

Descriptors: (*Transportation, Volume), (*Traffic, Mathematical prediction), Mathematical models, Statistical analysis, Linear systems, Reliability, Railroads, Passenger vehicles, Economics, Roads, Classification, Distribution, Periodic variations, Bridges.
Identifiers: Northeast corridor transportation project, Travel demand.

The document covers a mathematical means of estimating travel demand in New England and the Middle Atlantic states.
PB-177 610 HC$3.00 MF$0.65

INVESTIGATION OF MOTOR VEHICLE PERFORMANCE STANDARDS FOR FUEL TANK PROTECTION. VOLUME I.
Final rept. on phase 1.
Fairchild Hiller Corp., Farmingdale, N. Y.
29 Sep 67, 143p
Contract FH-11-6608

Descriptors: (*Passenger vehicles, *Fire safety), (*Fuel tanks, Standards), Motor vehicle accidents, Fuel systems, Protection, Statistical analysis, Ignition, Hazards, Failure (Mechanics), Explosions, Rupture, Leakage (Fluids), Design, Test methods, Structural properties, Explosions, Performance (Engineering), Abandonment.
Identifiers: Fuel tank protection.

Explosion and/or fire could occur during or immediately following an accident involving motor vehicles. The source of a fire can be as varied as a hot cigarette, a shorted electrical wire, friction induced sparks, or a hot exhaust system. Spillage of the motor vehicles fuel on any such ignition source usually results in a serious fire with the possibility of burn injury or fatality. In order for the Department of Transportation to present reasonable safety performance standards for motor vehicle fuel systems, a background of information regarding existing standards, accident data, improved fuel system designs, and performance tests had to be accumulated. This study for the Department of Transportation, was made to accumulate such information, evaluate it, and present a plan for establishing safety performance standards for fuel tanks and fuel systems. (Author)
PB-177 690 HC$3.00 MF$0.65

THE CABLE AND CHAIN-LINK CRASH BARRIER,
Road Research Lab., Crowthorne (England).
V. J. Jehu, and I. B. Laker. 1967, 29p RRL-LR105

Descriptors: (*Roads, Great Britain), (*Safety, Cables (Mechanical)), Impact tests, Test equipment, Chains, Flexible structures, Steel, Supports, Test methods, Deflection, Passenger vehicles, Photographic techniques, Measurement, Deceleration, Tables.

Ten impact tests were carried out on alternative constructions of cable and chain-link barriers, similar to one originally developed in California in 1959 for use on central reservations at least 16 feet wide. In this American barrier, two steel cables are clamped one either side of a line of steel posts, the intention being that under impact loading the cables should press into the bodywork of the vehicle to redirect it, their initial height above the ground being maintained at the vehicle by virtue of the fact that they slide off the ends of posts which bend ahead of the vehicle. The tests consisted in guiding cars, usually by remote control, into barriers 200 feet in length, photographing the vehicle-barrier responses, and measurthe ing vehicle decelerations. Speeds up to 60 miles an hour, and angles up to 20 degrees to the line of barrier were employed. (Author)
PB-177 717 HC$3.00 MF$0.65

DELAYS TO TRAFFIC CAUSED BY THE MOVEMENT OF ABNORMAL INDIVISIBLE LOADS,
Road Research Lab., Crowthorne (England).
J. B. Dunn. 1967, 22p RRL-LR107

Descriptors: (*Traffic, Inhibition), Cargo vehicles, Velocity, Vehicles, Volume, Tables, Roads, Costs, Statistical analysis, Payload, Great Britain, Cargo, Configuration.
Identifiers: Abnormal-indivisible loads, Sizes (Dimensions).

Studies have been made of the delays caused to other traffic by the movement of abnormal indivisible loads. This report gives results for eleven load movements which were observed over a total distance of 1264 miles on all-purpose, most by single carriageway, roads. Average delays are given in terms of minutes per vehicle to the overtaking and to the opposing traffic, and also in terms of vehicle-hours of delay per mile travelled by the load; for both traffic streams together the latter figure ranged from 2 to 16 vehicle-hours for the different loads. The cost, per mile travelled by the load, to other traffic and to the police is also estimated. (Author)
PB-177 718 HC$3.00 MF$0.65

EFFECT OF ONE DAY'S WITHDRAWAL OF TAXI SERVICES ON TRAFFIC IN THE WEST END OF LONDON,
Road Research Lab., Crowthorne (England).
M. Marlow. 1967, 13p RRL-LR114

Descriptors: (*Passenger vehicles, Great Britain), (*Traffic, Volume), Statistical analysis, Classification, Distribution, Roads, Velocity, Counting methods, Statistical data, Tables, Periodic variations.
Identifiers: London (England), Taxicab strikes.

A partial cordon survey was made of the West End of London during a one day's withdrawal of taxis, in order to find out what effect their absence had on the flows and speeds of other forms of road transport and how much spare traffic capacity would be available. (Author)
PB-177 720 HC$3.00 MF$0.65

COST OF ROAD ACCIDENTS IN GREAT BRITAIN,
Road Research Lab., Crowthorne (England).
R. F. F. Dawson. 1967, 80p RRL-LR79

Descriptors: (*Motor vehicle accidents, Great Britain), Classification, Statistical data, Mortality rates, Costs, Industrial production, Wounds + injuries, Medicine, Time studies, Damage assessment, Correlation techniques, Manpower studies, Research program administration.

An estimate is made of the measurable costs to the community of road accidents in Great Britain. The calculations are based on 1963 but estimates of the costs are made for 1964 and 1965. Costs have been evaluated separately for urban areas, rural areas and for accidents of different severities. The total measurable costs of accidents occurring in 1965 were estimated to be 246 million pounds sterling made up as follows: medical treatment 12 million pound sterling, damage to property 164 million pound sterling, administrative 28 million pounds sterling, loss of future output 42 million pounds sterling. Average costs per accident have also been evaluated for accidents of different severities and in urban and rural areas. The total cost of all accidents divided by the number of personal injury accidents is 820 million pounds sterling. When tentative values are placed on the cost of suffering and bereavement this average becomes 1020 million pounds sterling. (Author)
PB-177 779 HC$3.00 MF$0.65

13G. Hydraulic and Pneumatic Equipment

CALIBRATION OF FLUIDIC OSCILLATOR TIME MARK GENERATORS FOR SELF-RECORDING GAGES.
Ballistic Research Labs Aberdeen Proving Ground Md
For primary bibliographic entry see Field 14B.
AD-666 770 HC$3.00 MF$0.65

13H. Industrial Processes

DIGITAL DEVICES FOR AUTOMATIC CONTROL: MEASUREMENT AND GUIDANCE,
Foreign Technology Div Wright-Patterson AFB Ohio
I. V. Butusov. 11 Aug 67, 395p Rept no. FTD-MT-65-61

Edited machine trans. of mono. Tsifrovye Ustroistva dlya Avtomaticheskogo Kontrolya, Izmereniya i Upravleniya, Leningrad, 1964 387p.

Descriptors: (*Automation, Digital systems), (*Data processing systems, Automation), Digital recording systems, Production control, Information theory, Quality control, Measuring devices (Electrical + electronic), Ferrites, Semiconductor devices, Analog-to-digital converters, Digital-to-analog converters, Reliability, USSR.
Identifiers: Automatic control systems, Translations.

The book considers digital equipment for automatic control and measurement of production processes. It presents the basic characteristics and describes the operating principles of automatic digital instruments, machines for centralized control, and automatic control machines. Basic attention is given to digital equipment using ferrite and semiconductor components. The book is intended for engineers and technicians concerned with the development and use of automation resources; it can also be useful to students in higher educational institutions and technicums specializing in instruments and systems of automatic control. (Author)
AD-666 726 HC$3.00 MF$0.65

DEVELOPMENT OF PRACTICE FOR COMPOSITE ROLLING OF STRUCTURAL METAL PANELS.
Quarterly progress rept. no. 6, 15 Aug-15 Nov 67,
Battelle Memorial Inst Columbus Ohio Columbus Labs
J. R. Van Orsdel, D. N. Williams, and E. S. Bartlett. Feb 68, 19p
AMMRC-CR-66-02/6
Contract DA-19-066-AMC-308 (X)
See also Quarterly rept. no. 5, AD-659 429.

Descriptors: (*Rolling (Metallurgy), *Panels (Structural)), Diffusion bonding, Laminates, Nickel alloys, Steel, Titanium alloys, Beryllium, Titanium, Sheets, Feasibility studies.
Identifiers: Titanium alloy B-120 VCA, Rene 41 (Alloy).

Initial studies performed on small laboratory-size panels indicated that Rene 41 is amenable to roll-diffusion bonding. However, completely satisfactory practice has not yet been defined. In addition, the experimentation has shown that Ti-Namel steel is a superior support material in promoting bond development in Rene 41 while SAE 1020 steel was found to be unsatisfactory. Laboratory-size titanium panels with beryllium-stiffened skin sheets were fabricated with encouraging results. Short-term plans are to continue development of both Rene 41 and titanium-beryllium composite structures. (Author)
AD-666 751 HC$3.00 MF$0.65

EVALUATION OF FLIP/CHIP INTEGRATED CIRCUIT INTERCONNECTIONS.
Final development rept. 15 Oct 65-15 Oct 66.
Honeywell, Inc., Framingham, Mass. Computer Control Div.
25 Jan 67, 93p Rept. no. 130071754
Contract NObsr-95052

Descriptors: (*Integrated circuits, *Thermal joining), (*Modules (Electronics), Ultrasonic welding), Substrates, Manufacturing methods, Soldering, Circuit interconnections, Alumina, Aluminum, Shear stresses, Seals, Costs, Tensile properties, Thermal stability.
Identifiers: Flip/chip circuits.

In the final quarter of this study, work concentrated on thermal and ultrasonic methods of solder bonding and on methods and problems, associated with packaging a flip/chip module. Finally, an evaluation was made of all the information gathered and a best approach selected. (Author)
AD-806 935 HC$3.00 MF$0.65

DEVELOPMENT OF THE ULTRASONIC TECHNIQUE FOR ALUMINUM WELDS AND MATERIALS, PHASE I.

Automation Industries, Inc., Boulder, Colo. Research Lab.
B. T. Cross, and K. J. Hannah. 2 Oct 67, 67p
NASA-CR-61585, TR-67-59
Contract NAS8-18009

Descriptors: *Aluminum alloys, *Nondestructive tests, *Structural analysis, *Ultrasonic radiation, *Weld tests, *Welded structures, Crystal defects, Quality control.

For abstract, see STAR 06 09.
N68-18625 HC$3.00 MF$0.65

FEASIBILITY STUDY OF RESISTANCE WELDING OF ALUMINUM ALLOYS, STAINLESS STEEL, AND TITANIUM IN A HARD VACUUM FINAL REPORT, JUN. 27, 1967 - FEB. 29, 1968.
Battelle Memorial Inst., Columbus, Ohio.
D. L. Cheever, D. G. Howden, and R. E. Monroe.
29 Feb 68, 37p NASA-CR-61596
Contract NAS8-21196

Descriptors: *Aluminum alloys, *Stainless steels, *Tensile strength, *Welding, *X ray inspection, Metallography, Vacuum effects, Welded joints.

For abstract, see STAR 06 09.
N68-18777 HC$3.00 MF$0.65

BERYLLIUM FABRICATION METHODS DEVELOPMENT PROGRAM - THERMAL TREATMENT.
Lockheed Missiles and Space Co., Sunnyvale, Calif.
2 Jul 65, 63p NASA-CR-61659, LMSC/A758461
Contract NAS8-11798

Descriptors: *Beryllium, *Heat treatment, *Temperature effects, Airframes, Cooling, Fabrication, Metal sheets, Microstructure, Stress analysis, Structural analysis, Thermal stresses.

For abstract, see STAR 06 09.
N68-18973 HC$3.00 MF$0.65

SHAPING OF PRECIPITATION-HARDENING STAINLESS STEELS BY CASTING AND POWDER-METALLURGY.
National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
V. D. Barth, J. G. Kura, and H. O. Mc Intire.
1968, 51p NASA-SP-5086, RSIC-491
Contract NASA ORDER H-76715, DA-01-021-AMC-11651/Z/
Prep- Prepared By Army Missile Command and Battelle Mem. Inst.

Descriptors: *Casting, *Powder metallurgy, *Precipitation hardening, *Stainless steels, Cold pressing, Heat treatment, Mechanical properties, Sintering.

For abstract, see STAR 06 09.
N68-19307 HC$3.00 MF$0.65

SURFACE TREATMENTS FOR PRECIPITATION-HARDENING STAINLESS STEELS.
National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
1967, 64p NASA-SP-5090, RSIC-595
Contract DA-01-021-AMC-11651/Z/
Prep- Prepared By Battelle Memorial Inst.

Descriptors: *Precipitation hardening, *Stainless steels, *Surface finishing, Carburizing, Electroplating, Explosive forming, Metal working, Metallurgy, Nitriding, Protective coatings, Shot peening.

For abstract, see STAR 06 09.
N68-19343 HC$3.00 MF$0.65

DRILLING SYSTEM AUS THEREFOR.
Brown and Root, Inc., Houston, Tex.
1965, 5p
Contract NSF-C260

Descriptors: (*Drilling, *Stabilized platforms), (*Drills, Signals), (*Signals, Transmission), Pulse generators, Design, Underground, Tachometers, Load distribution, Liquids.
Identifiers: Weight indicators, Mohole project, Turbodrills, Drilling fluids.

The invention is a device to generate sound pulses which transmit two signals to the surface through the mud column. One signal gives the rate of rotation, the other indicates the relative weight on the bumper sub.
PB-177 387 HC$3.00 MF$0.65

REPORT OF NRL PROGRESS.
Naval Research Lab., Washington, D. C.
For primary bibliographic entry see Field 8B.
PB-177 727 HC$3.00 MF$0.65

COMBUSTION OF RESIDUAL FUEL WITH MASSIVE RECIRCULATION,
IIT Research Inst., Chicago, Ill.
For primary bibliographic entry see Field 13A.
PB-177 747 HC$3.00 MF$0.65

PROCESSES FOR RECOVERING SULFUR FROM SECONDARY SOURCE MATERIALS,
Bureau of Mines, Washington, D. C.
For primary bibliographic entry see Field 7B.
PB-177 760 HC$3.00 MF$0.65

THE SCOPE OF INDUSTRIAL TRAINING IN SELECTED SKILLED AND TECHNICAL OCCUPATIONS,
Stanford Research Inst., Menlo Park, Calif.
For primary bibliographic entry see Field 5I.
PB-177 762 HC$3.00 MF$0.65

13I. Machinery and Tools

A STUDY ON METHODS FOR THE DEVELOPMENT OF RELIABILITY, MAINTAINABILITY AND AVAILABILITY OF SHIPBOARD MACHINERY,
United Control Corp., Redman, Wash.
N. R. MacFarlane, and J. W. Mickel. May 64, 288p
Contract Nonr-3740 (00)

Descriptors: (*Machines, Shipborne), Maintainability, Reliability, Maintenance, Naval equipment, Failure (Mechanics), Mathematical analysis, Stresses, Defects (Materials), Fatigue (Mechanics), Agine (Materials), Wear resistance, Life expectancy.

The report develops the concepts of reliability, maintainability and availability, and emphasizes application to shipboard machinery of new design. A specific objective of study has been to arrive at methods for quantitatively specifying and predicting shipboard machinery utilization characteristics such as service life, capability to operate for given time intervals without failure, and maintainability. These methods were required to be practical, and amenable to quantitative numerical computation. A characteristic of shipboard machinery, and of machinery in general, is the non-experimental failure behavior of the parts. This contrasts strongly with the generally accepted exponential behavior of electronic parts. Because of this nonexponential behavior, new approaches are necessary for predicting, specifying and measuring a machine's reliability, maintainability and availability. For non-exponential probabilities, the mathematical description becomes complex. An objective of this study has therefore been to reduce the difficult mathematics to a straightforward engineering technique suitable both for manual arithmetical computation and for computer evaluation. (Author)
AD-441 685 HC$3.00

A FAST ACTING DIAPHRAGM CUTTER.
Memorandum rept.,
Ballistic Research Labs Aberdeen Proving Ground Md
Joseph H. Spurk, and Edmund J. Gion. Feb 68, 24p Rept no. BRL-MR-1902
Availability: Published in Review of Scientific Instruments, Mar 68.

Descriptors: (*Cutting tools, Diaphragms (Mechanics)), Foils, Shock tubes, Interferometers, Instrumentation.
Identifiers: *Electromechanical cutters.

A diaphragm cutter with short response time, where the diaphragm is placed sandwich-like between a movable and fixed spider arrangement, is described. The principle of operation is based on Ampere's law. The experimental path of the movable spider is compared with theoretical prediction, taking into consideration the actual cross section of the conductors, and good agreement is found. (Author)
AD-666 863 Not available from CFSTI.

SUPPORT MANUAL FOR APOLLO LUNAR SURFACE DRILL (ALSD).
Martin Co., Baltimore, Md.
15 Mar 67, 105p NASA-CR-65971, DSM-2
Contract NAS9-6587

Descriptors: *Apollo project, *Drills, *Lunar crust, *Space tools, Drill bits, Drilling, Lunar composition, Lunar geology, Lunar temperature, Manuals.

For abstract, see STAR 06 09.
N68-18599 HC$3.00 MF$0.65

MODEL FOR FREQUENCY RESPONSE OF A FORCED FLOW, HOLLOW, SINGLE TUBE BOILER.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
For primary bibliographic entry see Field 20D.
For abstract, see STAR 06 09.
N68-19340 HC$3.00 MF$0.65

DRILLING SYSTEM AUS THEREFOR.
Brown and Root, Inc., Houston, Tex.
For primary bibliographic entry see Field 13H.
PB-177 387 HC$3.00 MF$0.65

INTENSIVE BITUMINOUS PAVING TRIAL ON THE WARWICK BY-PASS,
Road Research Lab., Crowthorne (England).
For primary bibliographic entry see Field 13B.
PB-177 716 HC$3.00 MF$0.65

13J. Marine Engineering

A STUDY ON METHODS FOR THE DEVELOPMENT OF RELIABILITY, MAINTAINABILITY AND AVAILABILITY OF SHIPBOARD MACHINERY,
United Control Corp., Redman, Wash.
For primary bibliographic entry see Field 13I.
AD-441 685 HC$3.00

THE ANALYSIS OF MOORING SYSTEMS AND RIGID BODY DYNAMICS FOR SUSPENDED STRUCTURES.
Technical rept.,
Bell Telephone Labs Inc Whippany N J
J. M. Gormally, and R. Pringle. 30 Dec 66, 74p
Rept no. TR-14
Contract N00014-66-C-0005

Descriptors: (*Cables (Mechanical), Buoyancy), (*Mooring buoys, Hydrodynamics), Hydrophones, Mooring, Response, Loading (Mechanics), Drag, Deflection, Ocean currents, Numerical analysis, Integration.

The response of a moored body to current loadings is investi ated. A nonlinear analysis of the steady-state deflections of bipod and tripod moorings is made in Parts I and II. The mooring cables are assumed to be extensible and are loaded with constant gravity and current drag forces. It is shown

that the cable weight-in-water is a significant factor in the deflection limited design of a cable system. In Part III the cable mooring system is represented by linearized equations. Numerical integration is used to investigate the transient rotational and translational response of the moored body to changes in the ambient current. (Author)
AD-666 615 HC$3.00 MF$0.65

CURRENT MEASUREMENTS FROM MOORED BUOYS.
Woods Hole Oceanographic Institution Mass
For primary bibliographic entry see Field 8M.
AD-666 633 Not available from CFSTI.

EVALUATION OF SUPPLY CORPS FLEET TRAINING MATERIALS.
Naval Personnel Research Activity San Diego Calif Navy Training Research Lab
For primary bibliographic entry see Field 5I.
AD-666 826 HC$3.00 MF$0.65

UNIVERSITY SEALAB. CAPITAL AND OPERATING COST ANALYSIS FOR A SATURATION DIVING FACILITY FOR THE NATIONAL OCEANOGRAPHIC COMMUNITY.
Technical rept.,
New Hampshire Univ Durham Engineering Design and Analysis Lab
Godfrey H. Savage. Dec 67, 82p Rept no. TR-101
Contract Nonr-3710 (04)

Descriptors: (*Underwater vehicles, Deep submergence), Ocean bottom sampling, Costs, Laboratories, Design, Mobility, Budgets, Operation, Maintenance, Life support, Marine biology, Tables.
Identifiers: SEDOPOD Underwater Vehicle, OSCILAB Underwater Vehicle, Manned submersibles, SEALAB Project.

A detailed engineering design study has been conducted to determine the technical and economic feasibility of constructing a mobile saturation diving facility for the National Oceanographic Community. This document, which contains the cost analysis, is an addendum to the main report entitled, 'UNIVERSITY SEALAB,' published by the University of New Hampshire, EDAL Technical Report No. 100, January 1967. The University Sealab Project was sponsored by the Office of Naval Research, Contract No. NONR 3710-04. The capital investments and operating costs for a University Sealab are evaluated and discussed. (Author)
AD-666 834 HC$3.00 MF$0.65

ALVIN INSTRUMENTATION.
Technical rept.,
Woods Hole Oceanographic Institution Mass
W. M. Marquet. Mar 68, 4p Rept no. WHOI-Ref-68-10
Availability: Published in Nerem Record, Inst. Electr. Electron. Engrs., v9 p196-7 1967.

Descriptors: (*Underwater vehicles, Deep submergence), Instrumentation, Hydrophones, Underwater tracking, Oceanographic vessels, Underwater navigation.
Identifiers: Alvin (Oceanographic research vessel), Lulu (Oceanographic research vessel).

The paper describes the equipments used to establish the relative position of ALVIN from her mother ship, the R/V LULU. Operating procedures used at sea are also discussed. (Author)
AD-666 947 Not available from CFSTI.

EFFECT OF AN AMBIENT TURBULENCE COMPONENT ON MODEL CARRIER TURBULENCE DATA.
Research and development rept.,
Naval Ship Research and Development Center Washington D C Aerodynamics Lab
Stavros Loezos. Aug 67, 22p Rept no. Aero-1131
NSRDC-2561

Descriptors: (*Aircraft carriers, Turbulence), Ship models, Wind tunnel models, Experimental data, Wake, Boundary layer, Carrier landings.
Identifiers: CVS 16.

Tests were performed to examine the manner in which various components of induced turbulence combine. Ambient or background turbulence created in the wind tunnel with a grid of cylinders interacted with the turbulence induced by a model aircraft carrier in the wind tunnel. The interaction of the turbulence components was studied with the objective of developing methods of removal of the ambient turbulence component from the total component of turbulence. The method for the removal of ambient turbulence is being developed for application in the full-scale aircraft carrier turbulence program. (Author)
AD-666 958 HC$3.00 MF$0.65

QUARTERLY BULLETIN OF THE DIVISION OF MECHANICAL ENGINEERING AND THE NATIONAL AERONAUTICAL ESTABLISHMENT.
National Research Council of Canada Ottawa (Ontario) Div of Mechanical Engineering
For primary bibliographic entry see Field 5B.
AD-667 180 HC$3.00 MF$0.65

HYDROJET DUCTED PROPULSION SYSTEM - IMPELLER INDUCED VIBRATORY PRESSURES AND PERFORMANCE CHARACTERISTICS FINAL REPORT, 1 SEP. 1964 - 30 NOV. 1966.
Adelaide Univ. (Australia). Dept. of Mechanical Engineering.
M. R. Hale, and D. H. Norrie. Nov 66, 160p R6613, AD-664518
Contract NONR-4738/00//X/

Descriptors: *Ducted flow, *Impellers, *Inlet pressure, *Marine propulsion, *Vibratory loads, Shrouded propellers, Vortices.

For abstract, see STAR 06 09.
N68-18320 HC$3.00 MF$0.65

WAKE AND THRUST DEDUCTION AT EXTREME PROPELLER LOADINGS.
Swedish State Shipbuilding Experimental Tank, Goteborg.
SV. AAHarvald. 1967, 51p
Seri- Its Publ. No. 61

Descriptors: *Dynamic models, *Performance tests, *Wakes, *Water vehicles, Backwash, Boats, Cargo ships, Thrust measurement.

For abstract, see STAR 06 09.
N68-19074 HC$3.00 MF$0.65

A METHOD FOR THE DESIGN OF DUCTED PROPELLERS IN A UNIFORM FLOW.
Swedish State Shipbuilding Experimental Tank, Goteborg.
G. Dyne. 1967, 54p
Seri- Its Publ. No. 62

Descriptors: *Ducted bodies, *Numerical analysis, *Ships, *Structural design, *Turbulent flow, Dynamic characteristics, Flow distribution, Propeller blades, Vortices, Water vehicles.

For abstract, see STAR 06 09.
N68-19148 HC$3.00 MF$0.65

13K. Pumps, Filters, Pipes, Fittings, Tubing, and Valves

PRELIMINARY DESIGN OF AN ADVANCED EXHAUST GAS DIVERTER.
Solar San Diego Calif
For primary bibliographic entry see Field 21E.
AD-666 803 HC$3.00 MF$0.65

THE PUMPING SPEED FOR CARBON DIOXIDE BY THE ACTION OF A SURFACE COOLED BY LIQUID NITROGEN AT GAS TEMPERATURES RANGING FROM 136 DEG K TO 548 DEG K.
National Aeronautics and Space Administration, Washington, D. C.
For primary bibliographic entry see Field 20M.
For abstract, see STAR 06 09.
N68-19364 HC$3.00 MF$0.65

13L. Safety Engineering

AN EXPERIMENTAL AND MATHEMATICAL STUDY OF THE MECHANISM OF WOOD IGNITION.
Southwest Research Inst., San Antonio, Tex.
For primary bibliographic entry see Field 11L.
AD-474 021 HC$3.00 MF$0.65

SKID RESISTANCE OF BITUMINOUS SURFACES.
New York State Dept. of Transportation, Albany.
For primary bibliographic entry see Field 13B.
PB-177 481 HC$3.00 MF$0.65

SURVEY OF USERS AND SOURCES OF TRAFFIC SAFETY INFORMATION.
Technical memo.,
System Development Corp., Falls Church, Va.
Dennis A. Katter, Ruth M. Katz, and John L. Scroggins. 29 Dec 67, 90p TM-WD-1700-001/00
Contract FH-11-6545
Report on National Traffic Safety Documentation Center Project Definition Study.

Descriptors: (*Traffic, Safety), Documentation, Sources, Libraries, Organizations, Questionnaires, Abstracts, Periodicals, Bibliographies.

The results of the first two of seven tasks concerned with developing parameters of a National Traffic Safety Documentation Center are described. The methodology and results of a survey of users and sources of traffic safety information are reported. The needs and environments of typical users at state and local levels are modeled. Existing sources of traffic safety information are discussed and those of greatest potential importance to a national center are described. The paper concludes with a statement of user-expressed needs and with comments on quantitative problems that will affect design consideration. Complete lists of persons and organizations surveyed and the questionnaires used are included in the appendices. (Author)
PB-177 701 HC$3.00 MF$0.65

DOCUMENTATION CENTER, VOLUME I.
Michigan Univ., Ann Arbor. Highway Safety Research Inst.
For primary bibliographic entry see Field 13B.
PB-177 703 HC$3.00 MF$0.65

STUDY OF CLEARANCE INTERVAL AT TRAFFIC SIGNALS.
Final rept.,
California Univ., Berkeley. Inst. of Transportation and Traffic Engineering.
Adolf D. May, Jr. Aug 67, 103p
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Visual signals, Traffic), (*Traffic, Safety), Law, Motor vehicle accidents, Urban areas, Photographic techniques, Rural areas, Site selection, Questionnaires, Data processing systems, Analysis, Tables.

The report contains extensive bibliography on the subject as well as a review of various state laws pertaining to the interpretation of the amber period. Field studies were conducted at urban and rural intersections. Data was collected by photo-

graphic methods. The effect of extending the amber was analyzed for various approach speeds and safe and unsafe practices defined and tabulated. In addition the effect of pavement markings and advance signing was oested. Although the results show certain trends there seems to be no statistical significance to various changes. (BPR Abstract)
PB-177 709 HC$3.00 MF$0.65

THE CABLE AND CHAIN-LINK CRASH BARRIER,
Road Research Lab., Crowthorne (England).
For primary bibliographic entry see Field 13F.
PB-177 717 HC$3.00 MF$0.65

13M. Structural Engineering

CREEP OF A CRACKED REINFORCED BEAM.
California Univ Berkeley
Jerome L. Sackman, and Robert E. Nickell. Jan 68, 30p
AROD-4547:33
Contract DA-31-124-ARO (D)-460
Availability: Published in Journal of the Structural Division, Proceedings of the American Society of Civil Engineers, v94 ST1 p283-308 1968.

Descriptors: (*Beams (Structural), Creep), Viscoelasticity, Reinforced concrete, Theory, Cracks, Fracture (Mechanics), Stresses, Compressive properties, Numerical analysis, Integral equations.

Conventional cracked reinforced concrete beam theory is extended to include general linear viscoelastic behavior of the matrix (concrete) material in compression. An analytical formulation is developed which leads to a single governing equation on the position of the neutral axis. Although it has not been possible to obtain a general closed solution, some important properties of the solution of this nonlinear, Volterra-type integral equation are established. The relationship of this theory to a popular approximate procedure, known as the effective modulus method, is discussed. The nonlinear integral equation is resolved numerically, and results are shown for several cases of interest. (Author)
AD-666 639 Not available from CFSTI.

BEHAVIOR OF CIRCULAR TUBES BURIED IN SAND UNDER DYNAMIC LOADING.
Final rept.,
Army Engineer Waterways Experiment Station Vicksburg Miss
Algirdas G. Leskys, and Gayle E. Albritton. Feb 68, 70p Rept no. Miscellaneous Paper-1-964

Descriptors: (*Underground structures, *Loading (Mechanics)), Brass, Cylindrical bodies, Sand, Pressure, Stresses, Blast, Deflection, Buckling (Mechanics), Correlation techniques, Test methods, Functions, Mathematical prediction, Flexible structures, Structural properties.
Identifiers: Overpressure.

The general objective of this investigation was to study experimentally the behavior to failure of flexible, horizontally oriented circular tubes buried at various depths in dense, dry sand and subjected to dynamic surface overpressures. Dynamic tests were conducted on ten brass tubes in the Small Blast Load Generator. The tubes had a wall thickness of 0.005 inch, an outside diameter of 4 inches, and a specially isolated 5.75-inch-long test section. The tubes were flexible and had a stiffness EI/R3 of 0.018 psi. To examine the effect of depth of burial, tests were conducted in dense, dry sand at depths ranging from 1 to 16 inches, or four tube diameters above the crown. The dynamic tests were conducted at overpressures ranging from 6.2 to 34.9 psi. Measurements were made of the applied overpressure, and the tube deflection was recorded by means of a high-speed camera linked to the pressure-time base. Results indicate that collapse of the tubes was initiated by a buckle that occurred along a longitudinal seam where the tubes were spliced. The dynamic collapse overpressure increased greatly with increased depth of burial down to a depth of one tube diameter; subsequently, the increase in collapse overpressure with increase of burial depth to four tube diameters was insignificant. The dynamic collapse overpressure was approximately the same as the static collapse overpressure as determined from correlation with previously reported results. The results of this investigation have verified the applicability of an equation for predicting the dynamic collapse overpressure of very flexible tubes. (Author)
AD-666 768 HC$3.00 MF$0.65

A STUDY OF BUCKLING AND SNAPPING UNDER DYNAMIC LOAD,
Aerospace Corp El Segundo Calif Lab Operations
For primary bibliographic entry see Field 20K.
AD-666 914 HC$3.00 MF$0.65

THE INFLUENCE OF STIFFENER GEOMETRY AND SPACING ON THE BUCKLING OF AXIALLY COMPRESSED CYLINDRICAL AND CONCIAL SHELLS,
Technion - Israel Inst of Tech Haifa Dept of Aeronautical Engineering
For primary bibliographic entry see Field 20K.
AD-666 920 HC$3.00 MF$0.65

BUCKLING OF UNSTIFFENED CONICAL SHELLS UNDER COMBINED LOADING,
Technion - Israel Inst of Tech Haifa Dept of Aeronautical Engineering
A. Berkovits, J. Singer, and T. Weller. 18 Mar 68, 12p
AFOSR-68-0629
Grant AF-EOAR-58-63
Prepared for presentation at the SESA Spring Meeting held in Ottawa, Ont., Can., on May 16-19, 1967.
Availability: Published in Experimental Mechanics, v7 p458-67 Nov 1967.

Descriptors: (*Structural shells, *Buckling (Mechanics)), Conical bodies, Loading (Mechanics), Cylindrical bodies, Theory, Optimization, Aluminum alloys, Interactions.

An experimental program was conducted in order to determine the family of interaction curves for the buckling of unstiffened conical shells under combined axial compression, torsion, and external or internal pressure. Careful experimental technique permitted many repeated buckling tests on the same aluminum-alloy shell without noticeable damage and yielded reliable interaction curves. Results of combined-loading tests are presented and compared with linear theory. Test results show that the interaction curve for compression-torsion-pressure loading is defined by superposition of compression-pressure, torsion-pressure and compression-torsion behavior. (Author)
AD-667 127 Not available from CFSTI.

HISTORIC AMERICAN BUILDINGS SURVEY.
National Park Service, Washington, D. C. Historic American Buildings Survey.
1941, 479p
Catalog of the Measured Drawings and Photographs of the Survey in the Library of Congress, March 1, 1941.

Descriptors: (*Buildings, United States), Catalogs, Reviews, Libraries, Construction materials, History, Indexes, Photographs, Graphics, Puerto Rico.
Identifiers: Historic buildings.

As the results stand on March 31, 1941, there is now prepared a card index of 3,000 subjects to be considered for recording. The actual records cover 2,693 structures measured and drawn in 23,765 sheets of uniform size, and 25,357 photographic negatives which add 3,696 structures recorded in photographs only. The total recorded in one way or another is 6,389. In the great majority of cases, subjects which have been measured have also been photographed. Each set of measured drawings is provided with a cover sheet, not included in the foregoing enumeration. This serves not only as title page, but contains brief information as to the identity, date, and location of the subject. With each completed record there is also a page of data, giving the present ownership, condition, name of builder, and date of building where known. No attempt has generally been made at authenticating the traditional history of the buildings, though in a few cases it has been possible to expand these pages of data to include some historical research. (Author)
PB-177 632 HC$3.00 MF$0.65

HISTORIC AMERICAN BUILDINGS SURVEY. CATALOG OF THE MEASURED DRAWINGS AND PHOTOGRAPHS OF THE SURVEY IN THE LIBRARY OF CONGRESS, COMPRISING ADDITIONS SINCE MARCH 1, 1941.
National Park Service, Washington, D. C.
Jan 59, 181p
See also Historic American ... (Catalog), PB-177 632.

Descriptors: (*Buildings, Catalogs), (*United States, History), Documentation, Urban areas, Rural areas, Construction, Design, Labels, Maintenance, Mechanical drawing, Photographs.
Identifiers: Library of Congress.

Catalog of the measured drawings and photographs of the survey in the Library of Congress, comprising additions since March 1, 1941. (Author)
PB-177 633 HC$3.00 MF$0.65

INVESTIGATION OF MOTOR VEHICLE PERFORMANCE STANDARDS FOR FUEL TANK PROTECTION. VOLUME I.
Fairchild Hiller Corp., Farmingdale, N. Y.
For primary bibliographic entry see Field 13F.
PB-177 690 HC$3.00 MF$0.65

STRENGTH EFFECT OF CUTTING OFF TENSION BARS IN CONCRETE BEAMS.
Texas Univ., Austin. Center for Highway Research.
For primary bibliographic entry see Field 11B.
PB-177 700 HC$3.00 MF$0.65

INVESTIGATION OF THE BEHAVIOR OF CONCRETE UNDER TENSILE STRAIN GRADIENTS,
Florida Univ., Gainesville. Engineering and Industrial Experiment Station.
M. A. Cassaro, and Harold Holland. Jan 68, 69p

Descriptors: (*Concrete, Tensile properties), Test methods, Statistical data, Stresses, Failure (Mechanics), Experimental data, Reinforced concrete, Specifications, Sampling, Crack propagation, Cracks, Rupture, Loading (Mechanics), Rectangular bodies, Modulus of elasticity, Compressive properties, Limestone.
Identifiers: Aggregates (Materials).

The results of an investigation into the relationship between several standard tests on concrete are reported. Specifically, the modulus of rupture test, the split cylinder test and the cylinder compression test are compared with a direct tension test of a 3.5 inch rectangular specimen subjected to a tensile strain gradient. The primary experiment involved mortar specimens, although concretes containing limestone and 'solite,' a lightweight aggregate, were also investigated. (BPR Abstract)
PB-177 707 HC$3.00 MF$0.65

A LABORATORY INVESTIGATION OF THE PHYSICAL AND CHEMICAL PROPERTIES OF BURNT COLLIERY SHALE,

Road Research Lab., Crowthorne (England).
For primary bibliographic entry see Field 8M.
PB-177 710 HC$3.00 MF$0.65

EARTHWORKS IN SOFT CHALK: A STUDY OF SOME OF THE FACTORS AFFECTING CONSTRUCTION,
Road Research Lab., Crowthorne (England).
For primary bibliographic entry see Field 8M.
PB-177 711 HC$3.00 MF$0.65

THE D.A.V. AND BLOCKED-OUT BEAM CRASH BARRIERS,
Road Research Lab., Crowthorne (England).
For primary bibliographic entry see Field 13B.
PB-177 721 HC$3.00 MF$0.65

THE WIRE-ROPE SLOTTED-POST CRASH BARRIER,
Road Research Lab., Crowthorne (England).
For primary bibliographic entry see Field 13B.
PB-177 723 HC$3.00 MF$0.65

PROJECTION OF APPLICATIONS AND NATIONAL BENEFITS OF A NEW RAPID EXCAVATION TECHNOLOGY.
Operations Research, Inc., Silver Spring, Md.
For primary bibliographic entry see Field 8I.
PB-177 784 HC$3.00 MF$0.65

14. METHODS AND EQUIPMENT

14A. Cost Effectiveness

COST FUNCTIONS AND BUDGETS (COST CONSIDERATIONS IN SYSTEMS ANALYSIS),
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 5A.
AD-666 656 HC$3.00 MF$0.65

VALUE ENGINEERING FINAL REPORT FOR LIGHT OBSERVATION HELICOPTER AVIONICS PACKAGE.
Sylvania Electronic Systems-Central Williamsville N Y
For primary bibliographic entry see Field 1C.
AD-666 792 HC$3.00 MF$0.65

14B. Laboratories, Test Facilities, and Test Equipment

CONFERENCE ON ENVIRONMENTAL EFFECTS ON AIRCRAFT PROPULSION (1ST). A COMPILATION OF THE PAPERS PRESENTED JUNE 22 AND 23, 1961.
Naval Air Turbine Test Station, Trenton, N. J.
For primary bibliographic entry see Field 21E.
AD-461 804 HC$3.00

CONTRIBUTION TO THE KNOWLEDGE OF MAGNETIC BALANCE AND SUSPENSION SYSTEMS.
Technical rept. Nov 65-May 67,
Massachusetts Inst of Tech Cambridge Aerophysics Lab
Alan Copeland, Eugene Covert, Robert Petersen, and Timothy Stephens. Dec 67, 58p Rept no. TR-139
ARL-67-0283
Contract AF 33 (615)-1470

Descriptors: (*Wind tunnels, *Balances), (*Suspension devices, Wind tunnels), Magnetic fields, Design, Pitch (Motion), Yaw, Roll, Magnet coils, Torque, Control systems, Configuration, Feasibility studies, Calibration.
Identifiers: *Magnetic balance systems.

The report separates, for the purpose of discussion, into three distinct parts: comments on design studies for a large scale balance system; experimental studies of problems relating to the multiple use of an advanced configuration of coils for roll, pitch and yaw; and studies of a calibration system capable of automatic operation. The first part is a brief discussion of the philosophy behind the design. The nature of the compromises is included as well as a discussion of the performance goals for the design. The second part describes studies conducted to determine whether or not the pitching and yawing moment coil can also be used to generate rolling moments. In particular the problem of isolating the roll power supplies from the pitch and yaw power supplies, while loading the coils simultaneously, was studied in detail. It was found that this problem can be solved simply and that primary problems associated with multiple use of the coils include selection of the conductor, maximum potential and cooling. The third part contains a description of a multiple purpose calibration system. This system can either be used in the classical sense of applying the several loads and measuring the output from the data readout, or in the inverse sense that entails fixing currents in the magnetic balance and, by using the calibration system as a mechanical balance, determine the forces and moments on the model. While the latter use is unconventional it offers the promise of a fully automatic procedure. (Author)
AD-666 668 HC$3.00 MF$0.65

SIX-CHANNEL READOUT FOR A CHROMATOGRAPHIC ANALYSIS OF SPACE-CABIN ATMOSPHERE.
Melpar Inc Falls Church Va
For primary bibliographic entry see Field 6K.
AD-666 692 HC$3.00 MF$0.65

OPERATION AND MAINTENANCE MANUAL SIX-CHANNEL READOUT FOR A CHROMATOGRAPHIC ANALYSIS FOR SPACE CABIN ATMOSPHERES.
Melpar Inc Falls Church Va
For primary bibliographic entry see Field 6K.
AD-666 693 HC$3.00 MF$0.65

IMPROVED INTERNAL FRICTION APPARATUS,
Northwestern Univ Evanston Ill Dept of Materials Science
J. O. Brittain, J. D. Buch, and R. D. Carnahan.
Mar 68, 6p Rept no. TR-10
Coetract Nonr-1228 (17)
Availability: Published in The Review of Scientific Instruments, v38 n12 p1785-87 Dec 67.

Descriptors: (*Internal friction, Measurement), Diffusion, Dislocations, Motion, Iron, Carbon, Rutile, Quartz, Data processing systems.

The authors have developed an apparatus which will allow the measurement of internal friction with a precision of plus or minus 1.3% with data processing time a matter of seconds. The apparatus was designed for the range of 2-20 cps; however, the principle can readily be applied to a much broader frequency range. (Author)
AD-666 733 Not available from CFSTI.

DEVELOPMENT OF A FREE-FIELD SOIL STRESS GAGE FOR STATIC AND DYNAMIC MEASUREMENTS.
Army Engineer Waterways Experiment Station Vicksburg Miss
For primary bibliographic entry see Field 8M.
AD-666 769 HC$3.00 MF$0.65

CALIBRATION OF FLUIDIC OSCILLATOR TIME MARK GENERATORS FOR SELF-RECORDING GAGES.
Technical note.
Ballistic Research Labs Aberdeen Proving Ground Md
Charles H. Hoover. Dec 67, 41p Rept no. BRL-TN-1675

Descriptors: (*Timing devices, Calibration), Fluid amplifiers, Relaxation oscillators, Fluidics, Pressure gages, Recording systems, Temperature, High altitude, Airborne.
Identifiers: Overpressure.

Several factors affect the operating frequency of the fluidic oscillator time-mark generator used in the mechanical self-recording overpressure-time gages. The report delineates these factors, describes the methods of calibration and reports the results thereof. The primary factors considered are changes in ambient temperature, barometric pressure (altitude), and changes in the fluid supply pressure. It is concluded from these tests that the present fluidic timers can be used under a wide range of environmental operating conditions with the application of the proper correction factor. The applications of these factors are presented. (Author)
AD-666 770 HC$3.00 MF$0.65

TRANSIENT TEMPERATURE BEHAVIOR OF THE THERMAL RADIOMETER.
Army Electronics Command Fort Monmouth N J
For primary bibliographic entry see Field 4A.
AD-666 771 HC$3.00 MF$0.65

A FAST ACTING DIAPHRAGM CUTTER.
Ballistic Research Labs Aberdeen Proving Ground Md
For primary bibliographic entry see Field 13I.
AD-666 863 Not available from CFSTI.

INVESTIGATION OF CRYSTAL IMPERFECTIONS BY MEANS OF LASER LIGHT SCATTERING.
Air Force Cambridge Research Labs L G Hanscom Field Mass
For primary bibliographic entry see Field 20B.
AD-666 918 HC$3.00 MF$0.65

STUDY AND DEVELOPMENT OF A SIMULATION INFINITE DEPTH OF FIELD OPTICAL PICKUP.
Goodyear Aerospace Corp Akron Ohio
For primary bibliographic entry see Field 20F.
AD-666 939 HC$3.00 MF$0.65

REMARKS ON THE ADJUSTMENT OF ENERGY-COMPENSATED SPECTROFLUOROMETERS,
Aerospace Research Labs Wright-Patterson AFB Ohio
Julius G. Becsey, and Karl Scheller. 1967, 6p
ARL-68-0013
Availability: Published in Review of Scientific Instruments, v38 n12 p1793-4 Dec 1967.

Descriptors: (*Spectrometers, Operation), Luminescence, Spectroscopy, Cams, Monochromators, Photomultipliers, Thermocouples, Potentiometers.
Identifiers: Spectrofluorometers.

In certain types of energy-compensated spectrofluorometers a variable curvature cam is used to linearize the photomultiplier output signal with respect to wavelength. The cam mechanically controls the photomultiplier amplifier gain and is adjusted by changing its curvature. A technique is described for performing this adjustment so that a flat compensation curve is obtained for source spectrums containing sharp peaks. The ratio of photomultiplier to reference output signals is shown to be maintained constant over the entire luminescent wavelength range of interest. (Author)
AD-667 024 Not available from CFSTI.

THE -S/N- FATIGUE LIFE GAGE.
Micro-Measurements Inc Romulus Mich
27 Sep 65. 13p
Paper presented at International Congress on Experimental Mechanics (2nd), Washington, D. C., 28 Sep-1 Oct 65. See also AD-667 155.
Availability: Published in Experimental Mechanics, Ip Mar 1966.

Descriptors: (*Meters, *Fatigue (Mechanics)), Sensors, Damage, Structures, Life expectancy, Resistance (Electrical), Loading (Mechanics), Monitors.
Identifiers: *Fatigue life gages.

The -S/N- Fatigue Life Gage is a small sensor similar in appearance to the 'SA' foil strain gage. Standard strain gage application techniques are used. When permanently bonded to a critical area of a structure undergoing fatigue damage due to cyclic or random loading, the -S/N- Fatigue Life Gage undergoes an irreversible change in resistance. The magnitude of this change is a function of the load spectrum applied to the structure. When a correlation between resistance change and fatigue life is obtained, the new sensor furnishes a direct indication of remaining structural life. The -S/N- Fatigue Life Gage, unlike a strain gage, functions without being connected to readout instrumentation. The cumulative resistance change is large and can be measured at periodic intervals with simple instruments and the amount of fatigue damage ascertained. (Author)
AD-667 154 Not available from CFSTI.

THE S/N FATIGUE LIFE GAGE: 1ST EDITION.
Micro-Measurements Inc Romulus Mich
Aug 66. 45p
Prepared in cooperation with Bean (W. T.), Inc., Detroit, Mich.

Descriptors: (*Meters, Fatigue (Mechanics)), Sensors, Resistance (Electrical), Damage, Structures, Life expectancy, Loading (Mechanics), Monitors.
Identifiers: *Fatigue life gages.

The -S/N- Fatigue Life Gage is a small, bondable resistance sensor similar in appearance to a foil strain gage. When installed on critical areas of a structural component which is subjected to fatigue loading, the fatigue life gage generates a permanent resistance change as a continuous function of fatigue experience. Even when caused by a completely random program of load cycles, the resistance change accumulates as a function of actual structural fatigue damage over a wide spectrum of operating conditions. Unlike other resistance-changing sensors such as strain gages and resistance thermometers, the fatigue life gage need not be connected to read-out instrumentation while it is operating, but may be interrogated periodically using a suitable resistance measuring device which is connected to the gage only long enough to indicate or record gage resistance. In many cases, the resistance change is large enough to permit use of simple and inexpensive read-out instruments of the ohmmeter or wheatstone bridge type. Typical values for Delta R at the end of specimen life are 4 to 8 ohms for a 100 ohm sensor. (Author)
AD-667 155 HC$3.00 MF$0.65

USSR INDUSTRIAL DEVELOPMENT: ELECTRONICS AND PRECISION EQUIPMENT NO. 41,
Joint Publications Research Service, Washington, D. C.
For primary bibliographic entry see Field 5C.
JPRS-43594 HC$3.00 MF$0.65

AN INVESTIGATION OF THE VALIDITY OF BLACK BALL TESTS.
European Space Technology Center, Noordwijk (Netherlands).
L. A. Husain. Nov 67. 15p ESRO-TM-102/ESTEC/
Coll- 15 P

Descriptors: *Error analysis, *Solar simulators, *Space environment simulation, *Temperature distribution, Absorptivity, Calibrating, Coatings, Heat balance, Heat sinks, Instrument errors, Measuring instruments, Satellite instruments, Test chambers, Thermal simulation, Vacuum chambers.

For abstract, see STAR 06 09.
N68-18465 HC$3.00 MF$0.65

PRELIMINARY TESTS WITH MASS FLUX PROBE IN SUPERSONIC STREAM.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
G. E. Glawe, and L. N. Krause. Mar 68. 15p NASA-TM-X-1524
Contract 126-15-02-07-22

Descriptors: *Intake systems, *Mass flow rate, *Measuring instruments, *Performance tests, *Supersonic inlets, Air intakes, Blunt bodies, Inlet flow, Sharp leading edges, Structural design, Supersonic wind tunnels, Symmetry.

For abstract, see STAR 06 09.
N68-18834 HC$3.00 MF$0.65

AN EASILY CONSTRUCTED HIGH-PRESSURE LAMP FOR INTENSE LIGHT PULSES IN THE NANOSECOND RANGE.
Leicht Zu Bauende Hochdrucklampe Zur Erzeugung Von Intensiven Lichtimpulsen Im Nanosekundenbereich
Royal Aircraft Establishment, Farnborough (England).
H. G. Franke, and H. Schmeing. Nov 67. 9p
RAE-LIB-TRANS-1266
Tran- Transl. Into English From Nucl. Instr. and Methods (Denmark), V. 52, No. 1, 1967 P 171-172

Descriptors: *Flash lamps, *Gas discharges, *Light sources, High pressure, Hydrogen, Pulses.

For abstract, see STAR 06 09.
N68-19057 HC$3.00 MF$0.65

AN AUTOMATIC BALANCING SYSTEM FOR USE ON FRICTIONLESSLY SUPPORTED ATTITUDE-CONTROLLED TEST PLATFORMS.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
N. M. Hatcher, and R. N. Young. Mar 68. 24p
NASA-TN-D-4426
Contract 125-19-03-09-23

Descriptors: *Attitude control, *Balancing, *Stabilized platforms, Accelerometers, Accuracy, Balance, Center of gravity, Feedback control, Gas bearings, Space environment simulation, Space simulators, Torque.

For abstract, see STAR 06 09.
N68-19185 HC$3.00 MF$0.65

THERMO-MOLECULAR PRESSURE EFFECTS IN TUBES AND AT ORIFICES.
Advisory Group for Aerospace Research and Development, Paris (France).
G. D. Arney, Jr., and M. Kinslow. 1967. 66p
AGARDOGRAPH-119
Contract AF 40/600/-1200

Descriptors: *Gas pressure, *Instrument errors, *Orifice flow, *Pitot tubes, *Pressure effects, Heat transfer, Molecular flow, Nonequilibrium flow, Pressure distribution, Pressure measurements, Temperature gradients, Thermocouples.

For abstract, see STAR 06 09.
N68-19195 HC$3.00 MF$0.65

OUTGASSING OF WATER VAPOR FROM CONCRETE SURFACES IN VACUUM ENVIRONMENT.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
E. A. Maslowski, and A. C. Spagnuolo. Mar 68. 11p NASA-TM-X-1536
Contract 120-27-01-03-22

Descriptors: *Concretes, *Outgassing, *Vacuum effects, *Water vapor, Adsorption, Space simulators, Vacuum chambers, Water loss.

For abstract, see STAR 06 09.
N68-19207 HC$3.00 MF$0.65

LOW TEMPERATURE ELECTRON MICROSCOPY WITH HIGH FIELD SUPERCONDUCTING LENSES.
Chicago Univ., Ill. Dept. of Biophysics.
H. Fernandez-moran. 1965. 8p NASA-CR-76630
Grant NSG-441
Conf- Presented At 6th Intern. Cong. for Electron Microscopy, Kyoto, 27 Aug.-4 Sep. 1966

Descriptors: *Cryogenics, *Electron microscopes, *Lens design, *Superconductivity, Electric fields, Liquid helium, Magnetic fields, Perturbation, Solenoids, Wave front reconstruction.

For abstract, see STAR 06 09.
N68-19221 HC$3.00 MF$0.65

HIGH RESOLUTION ELECTRON MICROSCOPY OF BIOLOGICAL SPECIMENS.
Chicago Univ., Ill. Dept. of Biophysics.
H. Fernandez-moran. 1966. 8p NASA-CR-76632
Grant NSG-441
Conf- Presented At 6th Intern. Cong. for Electron Microscopy, Kyoto, 27 Aug.-4 Sep. 1966

Descriptors: *Bioinstrumentation, *Cryogenics, *Electron microscopes, Clean rooms, Cryostats, Deoxyribonucleic acid, Enzymes, Polymers, Ribonucleic acids, Single crystals, Thin films, Vacuum apparatus.

For abstract, see STAR 06 09.
N68-19222 HC$3.00 MF$0.65

SOLAR WIND SPECTROMETER PROJECT FINAL REPORT, APR. 1966 - JAN. 1968.
Electro-optical Systems, Inc., Pasadena, Calif. Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
10 Feb 68. 107p NASA-CR-93667, EOS-7069-FR
Contracts NAS7-100, JPL-951519
Prep- Prepared for Jpl

Descriptors: *Lunar surface vehicles, *Solar wind, *Spectrometers, *Structural design, Apollo project, Experimentation, Instrument packages, Product development.

For abstract, see STAR 06 09.
N68-19385 HC$3.00 MF$0.65

WEIGHTLESSNESS RESEARCH AT O.N.E.R.A.. les Recherches Sur l'Etat D'impesanteur A l'O.N.E.R.A.
National Aeronautics and Space Administration, Washington, D. C.
H. Le Boiteux. Mar 68. 25p NASA-TT-F-11515
Tran- Transl. Into English From Astronaut. Acta, V. 13, No. 3, 1967 P 289-303

Descriptors: *Aerospace medicine, *Artificial gravity, *Free fall, *Weightlessness simulation, High vacuum, Space environment simulation, Space flight.

For abstract, see STAR 06 09.
N68-19399 HC$3.00 MF$0.65

APPLICATIONS OF IMPROVED POINT CATHODE SOURCES TO HIGH RESOLUTION ELECTRON MICROSCOPY.
Chicago Univ., Ill. Biophysics Dept.
H. Fernandez-moran. 1966, 8p NASA-CR-76628
Conf- Presented At the 6th Intern. Congr. for Electron. Microscop., Kyoto, 27 Aug.- 4 Sep. 1966

Descriptors: *Cathodes, *Electron microscopes, *Single crystals, Anodes, Brightness, Electron beams, Irradiation, Metal foils, Molybdenum, Tungsten.

For abstract, see STAR 06 09.
N68-19400 HC$3.00 MF$0.65

DRILLING SYSTEM AUS THEREFOR.
Brown and Root, Inc., Houston, Tex.
For primary bibliographic entry see Field 13H.
PB-177 387 HC$3.00 MF$0.65

AN ATTEMPT TO MEASURE OBJECTIVELY THE QUALITY OF AIR.
National Swedish Inst. for Building Research, Stockholm (Sweden).
For primary bibliographic entry see Field 13B.
PB-177 763 HC$3.00 MF$0.65

14C. Recording Devices

TAPE RECORDING OF EARLY NUCLEAR WEAPON PHENOMENA,
Harry Diamond Labs Washington D C
John S. Wicklund. Dec 67, 17p Rept no. HDL-TM-67-25

Descriptors: (*Recording systems, Nuclear explosions), High frequency, Underground explosions, Magnetic tape, Nuclear weapons, Shock (Mechanics), Distortion, Mathematical analysis, Radiation damage, Accuracy.
Identifiers: Neat Ribbon Shot, *Weapons effect tape recorders.

It is shown that high-speed phenomena associated with underground nuclear weapon tests can be recorded with fair accuracy using suitably modified commercially available high-frequency recording equipment. The fundamental problem is stated, and the distortion of the phenomena (assumed to be gaussian pulses) is determined quantitatively. (Author)
AD-666 755 HC$3.00 MF$0.65

MAGNETIC TAPE RECORDING HANDBOOK,
Sylvania Electronic Systems-West Mountain View Calif Electronic Defense Labs
James A. Howard, and Lester N. Ferguson. Aug 67, 43p
Contract DA-28-043-AMC-01829 (E)
Reprinted by Hewlett-Packard Inter-Americas, Palo Alto, Calif., Application Note 89.

Descriptors: (*Recording systems, Handbooks), (*Magnetic tape, Recording systems), Signals, History, Response, High frequency, Standards, Broadband, Signal-to-noise ratio, Frequency modulation, Telemeter systems, Specifications, Handling, Storage.

The purpose of this handbook is to give those people concerned with operation and maintenance of tape recorders a better understanding of the theories and techniques of magnetic recording. In addition, some practical considerations are offered relating to the application and limitations of the direct and FM recording processes. These considerations should be of value to the system designer in adapting magnetic recording to his system requirements. (Author)
AD-666 797 HC$3.00 MF$0.65

PORTABLE FIELD RECORDING SYSTEM.
Technical rept.,
AC Electronics-Defense Research Labs Santa Barbara Calif Sea Operations Dept
Mar 68, 19p Rept no. TR68-15
Contract Nonr-4298 (00)

Descriptors: (*Seismic waves, Magnetic recording systems), (*Magnetic recording systems, Portable), Magnetic tape, Frequency modulation, Bandwidth, Crystal oscillators, Temperature, Stability, Amplifiers, Earthquakes, Detection, Extremely low frequency, Direct current.
Identifiers: Vela-uniform.

The Portable Field Recording System is a multichannel device that will record, unattended, for 24 hours in a frequency band from dc to 313 Hz. The system can operate without preempting a patch panel terminal, because female connectors are pigtailed in parallel with each signal input cable jack. Prime power for the system can be furnished by either a 12-vdc source or a 115-vac, 60-cycle source. (Author)
AD-666 828 HC$3.00 MF$0.65

WIDEBAND TELEVISION RECORDER FINAL REPORT.
Radio Corp. of America, Camden, N. J. Communications Systems Div.
1967, 94p NASA-CR-93526
Contract NAS9-4629

Descriptors: *Electronic equipment tests, *Microminiaturized electronic devices, *Performance tests, *Television equipment, Acceptability, Equipment specifications, Evaluation, Integrated circuits, Manuals, Microelectronics.

For abstract, see STAR 06 09.
N68-19047 HC$3.00 MF$0.65

14D. Reliability

MAXIMIZATION OF SYSTEM RELIABILITY WITH LIMITED RESOURCES.
California Univ Berkeley Operations Research Center
For primary bibliographic entry see Field 12B.
AD-666 619 HC$3.00 MF$0.65

CONTINUED RELIABILITY OF TRANSPORT-TYPE AIRCRAFT STRUCTURE.
Federal Aviation Agency Washington D C
For primary bibliographic entry see Field 1C.
AD-667 139 HC$3.00 MF$0.65

FAA DEVELOPMENTS RELATIVE TO DESIGN OF NEW AIRCRAFT STRUCTURES,
Federal Aviation Agency Washington D C Flight Standards Service
For primary bibliographic entry see Field 1C.
AD-667 140 HC$3.00 MF$0.65

ANATOMY OF A STRUCTURAL REPAIR,
American Airlines Tulsa Okla Maintenance and Engineering Center
For primary bibliographic entry see Field 1C.
AD-667 141 HC$3.00 MF$0.65

STRUCTURAL INSPECTIONS AND TECHNIQUES FOR OLDER TRANSPORT AIRCRAFT,
Delta Air Lines Inc Atlanta Ga
For primary bibliographic entry see Field 1C.
AD-667 142 HC$3.00 MF$0.65

AIRCRAFT STRUCTURE RELIABILITY PROGRAMS,
National Airlines Inc Miami Fla
For primary bibliographic entry see Field 1C.
AD-667 143 HC$3.00 MF$0.65

FACTORS OF SAFETY AND FAIL SAFE STRENGTH CRITERIA,
Federal Aviation Agency Washington D C Flight Standards Service
For primary bibliographic entry see Field 1C.
AD-667 144 HC$3.00 MF$0.65

FAA PRESENT AND FUTURE PHILOSOPHY IN REGULATING AIRCRAFT STRUCTURAL MAINTENANCE PROGRAMS,
Federal Aviation Agency Washington D C Flight Standards Service
For primary bibliographic entry see Field 1C.
AD-667 145 HC$3.00 MF$0.65

STRUCTURAL INSPECTION PLANNING FOR BUSINESS EXECUTIVE AIRCRAFT,
Grumman Aircraft Engineering Corp Bethpage N Y
For primary bibliographic entry see Field 1C.
AD-667 146 HC$3.00 MF$0.65

STRUCTURAL INSPECTION PROGRAMS,
Qantas Airways Ltd Sydney (Australia)
For primary bibliographic entry see Field 1C.
AD-667 147 HC$3.00 MF$0.65

AIRCRAFT STRUCTURE SAMPLING INSPECTION PROGRAMS,
United Air Lines Inc Chicago Ill
For primary bibliographic entry see Field 1C.
AD-667 148 HC$3.00 MF$0.65

STATE OF THE ART IN DESIGN AND TESTING TO ENSURE CONTINUED AIRCRAFT STRUCTURAL INTEGRITY,
Boeing Co Renton Wash Commercial Airplane Div
For primary bibliographic entry see Field 1C.
AD-667 149 HC$3.00 MF$0.65

THE STATE OF THE ART IN DESIGN AND TESTING CONCEPTS TO ENSURE STRUCTURAL INTEGRITY,
British Aircraft Corp (Operating) Ltd Weybridge (England) Weybridge Div
For primary bibliographic entry see Field 1C.
AD-667 150 HC$3.00 MF$0.65

THE EFFECTS OF TIME IN SERVICE ON STRUCTURAL INTEGRITY OF OLDER TRANSPORT AIRCRAFT,
Douglas Aircraft Co Inc Long Beach Calif Aircraft Div
For primary bibliographic entry see Field 1C.
AD-667 151 HC$3.00 MF$0.65

STRUCTURAL INSPECTION PROGRAMS - CORPORATION AIRCRAFT,
Atlantic Aviation Corp Wilmington Del Aircraft Maintenance Service
For primary bibliographic entry see Field 1C.
AD-667 152 HC$3.00 MF$0.65

CARE OF AIRFRAME STRUCTURES FOR BUSINESS AND EXECUTIVE AIRCRAFT,
Minnesota Mining and Mfg Co St Paul
For primary bibliographic entry see Field 1C.
AD-667 153 HC$3.00 MF$0.65

14E. Reprography

DYNAMIC ANALOG SPEECH SYNTHESIZER.
Technical rept.,
Massachusetts Inst. of Tech., Cambridge. Research Lab. of Electronics.
George Rosen. 10 Feb 60, 94p TR-353
Contract AF 19(604)-6102, DA-36-039-sc-78108
Doctoral thesis.

Descriptors: (*Analog systems, *Speech), Noise generators, Circuits, Coding, Communication theory, Control systems, Design, Excitation, Intelligibility, Language, Simulation, Sound signals, Speech representation, Speech transmission, Synthesis, Wiring diagrams.

A dynamically controllable electrical analog of the vocal tract that is capable of synthesizing sequences of speech sounds is described. The acoustic transmission line between glottis and lips in the human vocal tract is realized electrically be electronically controlled variable inductance-capacitance sections. Excitation is provided for simulating the glottal tone and the noise of turbulence. The synthesizer was conceived as an instrument for research on speech production and perception. Its control system is designed to permit the synthesis of any sequence of two phonetic elements, and provides precise, flexible control over many geometric and temporal variables. Exploratory formal listening tests were conducted, with idealized geometries for the vocal tract, and piecewise-linear functions were used for describing the timing relations. An articulation score of 93 per cent was obtained for vowels made with a parabolic approximation to the tongue hump. Listeners were within 5 per cent of unanimity in their identification of some fricatives in consonant-vowel syllables. At the phoneme boundary in these syllables, the tolerance for relative timing error between control signals is approximately 10-30 msec. Experimental evidence that strongly supports the viewpoint that the articulatory level provides a natural and economical description of speech is given. Thus, the dynamic analog is potentially capable of synthesizing highly natural connected speech from signals have a low information rate.
AD-251 764 HC$3.00

ELECTRO-OPTICAL SIGNAL PROCESSING TECHNIQUES FOR PHASED ARRAY ANTENNAS.
Columbia Univ., New York. Electronics Research Labs.
For primary bibliographic entry see Field 9F.
AD-440 342 HC$3.00 MF$0.65

INVESTIGATION OF THE PHOTOPOLYMERIZATION PROCESS.
General Aniline and Film Corp., Binghamton, N. Y. Photo and Repro Div.
For primary bibliographic entry see Field 7C.
AD-484 544 HC$3.00 MF$0.65

RESEARCH ON ELECTROSTATIC CHARGED DROPLET STREAMS.
TRW Systems Redondo Beach Calif
For primary bibliographic entry see Field 7D.
AD-666 669 HC$3.00 MF$0.65

IMAGE DENSITY GRADIENT ANALYSIS.
Perkin-Elmer Corp Norwalk Conn Electro-Optical Div
For primary bibliographic entry see Field 9B.
AD-666 937 HC$3.00 MF$0.65

LUNAR TV CAMERA, VOLUME 1 FINAL REPORT, OCT. 1964 - MAY 1967.
Westinghouse Electric Corp., Baltimore, Md. Defense and Space Center.
1 Jun 67, 261p NASA-CR-65987
Contract NAS9-3548

Descriptors: *Apollo project, *Electronic packaging, *Performance prediction, *Television cameras, Command modules, Connectors, Integrated circuits, Lunar exploration, Lunar module, Optical measuring instruments, Reliability engineering.

For abstract, see STAR 06 09.
N68-18544 HC$3.00 MF$0.65

OCEANOGRAPHIC COMMENT ON APOLLO 501 MISSION PHOTOGRAPHY.
Texas A&m Univ., College Station. Dept. of Oceanography.
J. E. Arnold, and D. Walsh. 30 Nov 67, 48p
NASA-CR-93429, AD-663457
Contract NONR-2119/04/
Spon- Sponsored By Nasa

Descriptors: *Aerial photography, *Apollo project, *Oceanography, *Photographic recording, Earth hydrosphere, Manned spacecraft, Nasa programs, Photointerpretation, Rocket-borne photography.

For abstract, see STAR 06 09.
N68-18773 HC$3.00 MF$0.65

IMAGE DISSECTOR CAMERA SYSTEM FINAL REPORT, 2 JUN. 1965 - 16 AUG. 1967.
ITT Industrial Labs., Fort Wayne, Ind.
20 Oct 67, 22p NASA-CR-93406, ITTIL-67-1051
Contract NAS5-9619

Descriptors: *Cameras, *Image dissector tubes, *Spaceborne photography, Cloud cover, Cloud photography, Nimbus satellites.

For abstract, see STAR 06 09.
N68-18852 HC$3.00 MF$0.65

VOYAGER SPACECRAFT PHASE B, TASK D. VOLUME 4 - ENGINEERING TASKS. BOOK 5 - PHOTO IMAGING FINAL REPORT.
General Electric Co., Philadelphia, Pa. Missile and Space Div.
16 Oct 67, 228p NASA-CR-93551, DIN-67SD4379, V. 4, BK. 5
Contract NAS8-22603

Descriptors: *Imagery, *Mars surface, *Spaceborne photography, *Voyager project, Data storage, Optical equipment, Photographic film, Spacecraft configurations, Spacecraft television.

For abstract, see STAR 06 09.
N68-19094 HC$3.00 MF$0.65

VOYAGER SPACECRAFT PHASE B, TASK D. VOLUME 11 - ENGINEERING STUDY TASK - PHOTO- IMAGING SYSTEM FINAL REPORT.
TRW Systems Group, Redondo Beach, Calif. Voyager Operations Space Vehicles Div.
Oct 67, 132p NASA-CR-93526
Contract NAS8-22604

Descriptors: *Imagery, *Spacecraft television, *Systems engineering, *Voyager project, Mapping, Mars (planet), Photographic film, Spaceborne photography, Systems analysis.

For abstract, see STAR 06 09.
N68-19162 HC$3.00 MF$0.65

ANALYSIS OF APOLLO AS-501 MISSION EARTH PHOTOGRAPHY.
National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.
J. E. Dornbach. Feb 68, 70p NASA-TM-X-58015

Descriptors: *Apollo project, *Meteorology, *Oceanography, *Photointerpretation, *Spaceborne photography, Cloud photographs, Color photography, Earth (planet), Essa 3 satellite, Photographic equipment.

For abstract, see STAR 06 09.
N68-19451 HC$3.00 MF$0.65

15. MILITARY SCIENCES

15A. Antisubmarine Warfare

A SIMULATION PROGRAM FOR THE EVALUATION OF AN ASW MISSION.
Final rept. Jan 66-Dec 67,
Stanford Research Inst Menlo Park Calif
O. F. Forsyth. Dec 67, 99p

Descriptors: (*Antisubmarine warfare, *Mathematical models), Sonar targets, Classification, Computer programs, Simulation, Mathematical prediction, Sonar signals, Echo ranging, Doppler effect, Sonar sound analyzers, Tactical warfare, Target recognition, Ranges (Distance), Ocean surveillance, Underwater object locators, Optimization, Subroutines.
Identifiers: Fortran, AN/SQS-23, Tactical range recorders.

This report presents the results of an Institute Research and Development (IR and D) project in the field of Antisubmarine Warfare (ASW). The objective, as it was finally defined, was to develop and apply an analytic tool for the investigation of the ASW contact classification problem. A computer simulation model was developed for the purpose of generating the evaluation clues commonly used in the contact classification procedure. These clues, singly and in combination, are then used to accumulate point value totals in eighteen categories. After a series of pings, linear weighting factors are applied to these numbers to arrive at a single weighted point value that is used to determine the contact classification. A separate program has been developed to generate optimized coefficient values for the linear weighting equation. Large numbers of submarine and nonsubmarine contacts may be evaluated, and the frequency distributions of the weighted point values in these two categories may be automatically plotted through the use of another computer program. Detailed validation of the simulation model was beyond the scope of this study, however follow-on work and more intensive analysis has been proposed to the Navy. FORTRAN listings of the various computer programs are included, and typical results for a small sample of contacts are presented. (Author)
AD-666 812 HC$3.00 MF$0.65

CREST: COMPUTER ROUTINE FOR EVALUATION OF SIMULATED TACTICS.
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
For primary bibliographic entry see Field 15G.
AD-666 832 HC$3.00 MF$0.65

15B. Chemical, Biological, and Radiological Warfare

CBE FACTORS: MONTHLY SURVEY NO. 22.
Library of Congress Washington D C Aerospace Technology Div
1968, 218p Rept no. ATD-68-49-50-4
Survey series on Chemical, Biological and Environmental Factors.

Descriptors: (*Chemical warfare agents, Reviews), (*Biological warfare agents, Reviews), (*Environment, Reviews), Pesticides, Herbicides, Fertilizers, Hallucinogens, Bacteria, Viruses, Epidemiology, Aerosols, Ecology, Micrometeorology, Soils, USSR, Eastern Europe, China.

The report is the twenty-second in a series of monthly surveys covering the following areas: Chemical factors--pesticides, herbicides, fertilizers, psychotomimetics, other chemicals; Biological factors--pathogens; Environmental factors--aerosols, ecology, micrometeorology, soil science.
AD-666 991 HC$3.00 MF$0.65

15C. Defense

SOCIAL ACTION IN CIVIL DEFENSE. THE STRATEGY OF PUBLIC INVOLVEMENT IN A COUNTY CIVIL DEFENSE EDUCATIONAL PROGRAM.
Summary rept. (Final),
Iowa Agricultural and Home Economics Experiment Station, Ames.
George M. Beal, Paul Yarbrough, Gerald E. Klonglan, and Joe M. Bohlen. 1964. 79p RSR-34
Contract OCD-OS-62-150

Descriptors: (*Civil defense systems, Group dynamics), Humans, Public opinion, Performance (Human), Social communication, Sociology, Decision making, Feasibility studies, Public relations, Education.

The purpose of the report was to focus on one aspect of social action and civil defense: The initiation and execution of large-group social action among individuals and organizations. Specific objectives of the report were (1) to present a construct of the social action process which can be used as a design for implementing social action programs and/or as a framework for analyzing existing or past social action programs, (2) to present an analysis of a social action program involving civil defense. (A) to present a descriptive background of the civil defense social action program analyzed. (B) to analyze in depth this social action program utilizing the social action model, and developing methodoloqhy to operationalize the social action construct for research purposes, and (3) to discuss the finding of the study and to explore the implications of these findings in the attempts of the office of civil defense to instigate other social action programs.
AD-451 079 HC$3.00

15D. Intelligence

PARAMETER ESTIMATION FOR STOCHASTIC SIGNALS WHICH ARE COHERENT IN PAIRS,
Michigan Univ Ann Arbor Inst of Science and Technology
For primary bibliographic entry see Field 9D.
AD-666 777 HC$3.00 MF$0.65

IMAGE DENSITY GRADIENT ANALYSIS.
Perkin-Elmer Corp Norwalk Conn Electro-Optical Div
For primary bibliographic entry see Field 9B.
AD-666 937 HC$3.00 MF$0.65

15E. Logistics

NAVAL RESEARCH LOGISTICS QUARTERLY. VOLUME 15, NO. 1, MARCH 1968.
Office of Naval Research Washington D C
1968, 127p
See also Volume 14 No. 1, AD-651 848.
Availability: Hard copy available from Superintendent of Documents, GPO, Washington, D. C. 20402 $0.50 as D210.12-Vol. 15/No. 1.

Descriptors: (*Naval research, Logistics), (*Operations research, Logistics), Reports, Linear programming, Dynamic programming, Department of Defense, Decision theory, Government procurement, Military training, Optimization, Scheduling, Functions, Economics, Handling, Costs, Theorems.
Identifiers: Integer programming, Quadratic assignment problem, Military theory.

Contents: On nonlinear optimization in integers; The sequencing of 'related' jobs; On the minimization of a certain convex function arising in applied decision theory; Suboptimal algorithms for the quadratic assignment problem; Economic impact and the notion of compensated procurement; A linear programming model for minimum-cost procurement and operation of Marine Corps training aircraft; Aircraft loading considerations: a sortie generator for use in planning military transport operations; Some notes on military theory.
AD-666 732 MF$0.65

COMPARATIVE ANALYSIS OF ARMY AVIATION MAINTENANCE CONCEPTS.
American Power Jet Co Ridgefield N J
For primary bibliographic entry see Field 1C.
AD-666 745 HC$3.00 MF$0.65

SEALED INSULATED MILITARY BOOTS.
Technical rept.,
Army Natick Labs Mass Clothing and Organic Materials Lab
Leslie H. L'Hollier, and Alice F. Park. Nov 67, 29p
USA-NLABS-TR-68-32-CM, FL-20

Descriptors: (*Shoes, *Thermal insulation), Design, Rubber, Seals, Frostbite, Exposure, Moistureproofing, Permeability, Water vapor, Perspiration, Construction, Armed forces supplies, Military personnel, Feet.
Identifiers: *Boots.

Sealed insulated rubber boots protect U.S. military personnel against cold injuries to the feet in wet-and dry-cold climates. The boots are constructed on a double vapor barrier principle, with an air chamber and insulating material sealed between two impermeable barriers of rubber. The outer boot wall or barrier protects the insulation against environmental water and the inner barrier next to the foot protects the insulation against foot perspiration and water vapor. By keeping the insulation dry, the double barriers eliminate the evaporation of moisture from the foot and sockgear which is a major cause of cold injury. The conception of the principle of the sealed insulated boot during World War II, its design and fabrication for its initial use in the Korean War, and subsequent improvements are discussed. (Author)
AD-666 752 HC$3.00 MF$0.65

DIRECT MOLDED SOLE BOOTS.
Technical rept.,
Army Natick Labs Mass Clothing and Organic Materials Lab
Alice F. Park, and Douglas S. Swain. Sep 67, 24p
USA-NLABS-TR-68-20-CM, FL-19

Descriptors: (*Shoes, Manufacturing methods), Molding, Army personnel, Tropical regions, Leather, Rubber, Vulcanization, Cost effectiveness, Maintenance, Honeycomb cores, Protection, Armed forces supplies, Shielding, Shock resistance, Military requirements, Metal plates.
Identifiers: *Boots, *Direct molded soles.

The U.S. Army Natick Laboratories modified a method of footwear construction known as Direct Molded Sole (DMS) for the Army's tropical and all-leather combat boots. NLABS developed the special component materials, boot designs and fabrication techniques required to produce military footwear by the DMS process. The sole and heel of the new DMS boots are molded directly to the boot uppers on high-pressure vulcanizing machines, eliminating the sole stitching and heel nailing which were the major points of failure in welt combat footwear. The DMS boots are significantly more durable and more comfortable than welt construction boots, and will save the military money both in production cost and by reducing boot repair and maintenance problems. The DMS process has enabled NLABS to incorporate special protective features into the tropical combat boot, including a steel shield to resist penetration of the boot bottom by punji stakes, and a wedge shank to deflect and absorb the impulse of antipersonnel land mines. (Author)
AD-666 756 HC$3.00 MF$0.65

AUTO-CORRELATION OF DEMAND IN A MULTI-ECHELON SYSTEM.
Technical rept.,
Frankford Arsenal Philadelphia Pa Inventory Research Office
Steven Gajdalo. 15 Dec 67, 27p

Descriptors: (*Army operations, Logistics), (*Inventory control, Mathematical prediction), (*Management planning, Inventory control), Statistical functions, Stochastic processes, Stock level control, Time series analysis.
Identifiers: Multi-echelon systems.

The paper considers the question of whether or not inventory levels at lower echelons should be used in the forecasting design for a multi-echelon supply system. The conjecture had been made that maintaining inventories (maximum assets) at the lower echelons proportional to their demand forecast would produce sufficient time dependence in the upper echelon demand pattern to result in demand autocorrelation at that level large enough to make possible a significant improvement in forecasting. Under the assumptions that (1) demand at the bottom is an independent wide-sense stationary stochastic process, (2) single exponential smoothing is used for demand forecasting, and (3) infinite demand history is available, upper echelon demand variability and autocorrelation coefficient function, R (n), is computed for several cases that vary in the degree of supply system complexity. In all cases R (n) is always negative and the absolute value is (a) bounded in the interval (0, .5), (b) monotonically decreasing with increasing time lag n, (c) monotonically increasing with increasing value of the smoothing constant. (Author)
AD-666 786 HC$3.00 MF$0.65

A MODEL FOR SIMULATING UNDERWAY REPLENISHMENT SHIP OPERATIONS,
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 15G.
AD-666 956 HC$3.00 MF$0.65

THE CONNECTIVITY FUNCTION OF A GRAPH,
Michigan Univ Ann Arbor Dept of Mathematics
For primary bibliographic entry see Field 12B.
AD-667 013 Not available from CFSTI.

RESIDENTJAL LOCATION AND URBAN MOBILITY,
Michigan Univ., Ann Arbor. Survey Research Center.
For primary bibliographic entry see Field 13B.
PB-177 693 HC$3.00 MF$0.65

15G. Operations, Strategy, and Tactics

RESEARCH ON HUMAN AERIAL OBSERVATION. PART I. SUMMARY.
George Washington Univ., Alexandria, Va. Human Resources Research Office.
For primary bibliographic entry see Field 5J.
AD-479 196 HC$3.00 MF$0.65

CHALLENGE AND RESPONSE IN INTERNAL CONFLICT. VOLUME I. THE EXPERIENCE IN ASIA,
American Univ Washington D C Center for Research in Social Systems
D. M. Condit, and Bert H. Cooper. Feb 68, 585p
Contract DAHC19-67-C-0046

Descriptors: (*Insurgency, Asia), (*Counterinsurgency, Asia), Unconventional warfare, Guerrilla warfare, Military organizations, Psychological warfare, China, Outer Mongolia, Philippines, Burma, Malaya, Vietnam, Indonesia, South Korea, History, Government (Foreign).
Identifiers: Area studies, Civic action, Jammu, Kashmir, Tibet.

The study is one of three volumes in a series entitled Challenge and Response in Internal Conflict. The series contains descriptive and analytical accounts covering a total of 57 cases of insurgency and counterinsurgency occurring in the 20th century. The three volumes are individually entitled The Experience in Asia, The Experience in Europe and the Middle East, and The Experience in Africa and Latin America. The purpose of the project was to enlarge the body of knowledge about insurgency and especially counterinsurgency by empirical study of actual historical cases. From a sample of about 150 cases, 57 were selected according to criteria governing time, definition, occurrence of military operations, analogy, and feasibility. Persons of academic and professional background were then selected to study individual cases according to a standardized methodology. The individual studies were written in a format covering background, insurgency, counterinsurgency, and outcome and conclusions, followed by notes and bibliographic material. The studies have been grouped geographically in three volumes to form casebooks on the subject of internal conflict. In addition, the cases now published plus some further materials collected during their preparation form a data bank for the further analysis of insurgency and counterinsurgency. (Author)
AD-666 747 HC$3.00 MF$0.65

COMMUNIST CHINA'S MILITARY DOCTRINES.
Technical paper,
Research Analysis Corp Mclean Va
Ralph L. Powell. Nov 67, 41p Rept no. RAC-TP-269
Contract DA-44-188-ARO-1

Descriptors: (*Military strategy, *China), National defense, Nuclear warfare, Insurgency, Leadership, Propaganda, Armed forces (Foreign), Communists, Government (Foreign), Unconventional warfare, Political science.

The study provides a compact, documented presentation and analysis of the principal military doctrines of Communist China, i.e., those on Chinese national defense, revolutionary warfare, and nuclear war, the first two of which have been strongly influenced by Mao. These have been spelled out in detail by official Chinese publications and are based on many years of Chinese Communist military experience. They are authoritative. Peking has not yet produced a full-fledged nuclear doctrine, but it has issued significant statements regarding nuclear weapons and nuclear war. Despite her ambitions, Peking has not published a doctrine regarding conventional warfare beyond her frontiers, for to do so would contradict her claim that by definition a Communist state cannot engage in aggressive wars. (Author)
AD-666 784 HC$3.00 MF$0.65

PROCEEDINGS OF THE OAR RESEARCH APPLICATIONS CONFERENCE, 21 MARCH 1968. VOLUME I.
Institute for Defense Analyses Arlington Va
For primary bibliographic entry see Field 5B.
AD-666 800 HC$3.00 MF$0.65

CREST: COMPUTER ROUTINE FOR EVALUATION OF SIMULATED TACTICS.
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
5 Nov 65, 52p Rept no. APL-PAM-85

Descriptors: (*Naval operations, Tactical warfare), (*War games, Computer programs), (*Antisubmarine warfare, Computer programs), Aircraft carriers, Submarines, Cold war, Naval aircraft, Guided missiles, Guided missile defense systems, Mathematical models, Probability, Subroutines, Flow charting, Punched cards.
Identifiers: CREST Computer program, Station-keeping, Computer simulation.

CREST, Computer Routine for Evaluation of Simulated Tactics, is a computer simulation primarily designed to study the interactions between various naval forces. The development of the model stemmed from the need to study the role of a CVA (aircraft carrier) in a global conflict. In the event of such a conflict, it may be necessary for a CVA to deliver its strike aircraft to an assigned launch area as expeditiously as possible while faced with the threat of hostile submarine forces. Further development of CREST added a 'cold war' study capability. This capability, in brief, allows the CVA maneuver within a given area, i.e., station keep. The CVA, in this situation, may well be opposed by submarines which attempt to get close to weapon range but do not intend to launch weapons. (Author)
AD-666 832 HC$3.00 MF$0.65

A MODEL FOR SIMULATING UNDERWAY REPLENISHMENT SHIP OPERATIONS,
Rand Corp Santa Monica Calif
T. W. Sikes. Jan 68, 77p Rept no. RM-5517-ISA
Contract DAHC15-67-C-0158

Descriptors: (*Naval operations, *Logistics), (*Computer programs, *Refueling), Naval vessels (Combatant), Simulation, Models (Simulations), Tactical warfare, Naval vessels (Support), Tankers, Fuels, Ordnance, Programming languages, Aircraft carriers, Subroutines.
Identifiers: Fortran, Computer simulation.

A listing and description of the FORTRAN IV simulation program for resupply at sea. This model was the principal analytical tool used in preparing RM-5155-ISA. Each simulation run accommodates as many as 32 cases wherein the activities of up to 20 carrier task groups (CTGs) are examined for 90 days. The CTGs are resupplied with oil or ammunition by underway replenishment (unrep) ships cycling between base and up to eight unrep locations. The task groups operate according to an input schedule that is always met, and the program determines the number of logistics ships needed to meet requirements. Daily printouts record the location, activity, receipts or issues, and inventory of each task group and each unrep ship, and at the end of the 90-day simulation runs a final summary printout is made. Unlike most computer simulations, this model has no built-in stochastic features; input data decks can be randomized, if desired. The main routine and nine subroutines have extensive internal documentation and commentary. (Author)
AD-666 956 HC$3.00 MF$0.65

BOMBING NORTH VIETNAM: AN APPRAISAL OF ECONOMIC AND POLITICAL EFFECTS,
Rand Corp Santa Monica Calif
Oleg Hoeffding. Dec 66, 43p Rept no. RM-5213-1-ISA
Contract SD-300

Descriptors: (*Tactical bombing, Vietnam), Counterinsurgency, Economics, Political science, Insurgency, Government (Foreign), Bargaining, Foreign policy, Threat evaluation, Limited war, Manpower, Agriculture, Propaganda.
Identifiers: North Vietnam.

An assessment is made of the U.S. air offensive against North Vietnam in terms of (1) its impact on the North Vietnamese economic and political structure, and (2) its value as a coercive force in inducing the North Vietnamese government to agree to negotiations. North Vietnamese reaction to the bombings is discussed, and implications for U.S. policy are examined. (Author)
AD-666 957 HC$3.00 MF$0.65

A TAPEHANDLER FOR THE CDC 1604.
Lambda Corp Arlington Va
For primary bibliographic entry see Field 9B.
AD-666 989 HC$3.00 MF$0.65

AEROMEDICAL ASPECTS OF HELICOPTER OPERATIONS IN THE TACTICAL SITUATION.
Advisory Group for Aerospace Research and Development, Paris (France).
For primary bibliographic entry see Field 6G.
For abstract, see STAR 06 09.
N68-19325 HC$3.00 MF$0.65

16. MISSILE TECHNOLOGY

16D. Missiles

OPTIMUM SEARCH FOR OBJECTS HAVING UNKNOWN ARRIVAL TIMES,
Sylvania Electronic Systems-West, Mountain View, Calif. Electronic Defense Labs.
Nelson Blachman, and Frank Proschan. 16 Sep 58, 25p EDL-E30
Contract DA-36-039-SC-75012

Descriptors: (*Guided missiles, Detection), Guided missile tracking systems, Mathematical analysis, Predictions, Optimization, Probability, Antimissile defense systems.

A mathematical solution of the following general search problem is proposed. Objects arrive in accordance with a Poisson process. Having arrived, the object appears (and remains until detected) in box i with probability P sub i. A single scan of box i costs C sub i (possibly including the cost of false alarms), takes time t sub i, and, if the object is present in box i at the beginning of the scan, will detect it with probability P sub i. The resultant gain g sub i (t) is a non-increasing function of t, the delay between arrival and the beginning of the detecting look; i equals 1, 2, ..., n. An asymptotically optimum search procedure is obtained. A number of particular cases of interest are solved.
AD-208 306 HC$3.00

A SIMPLIFIED TECHNIQUE FOR THE SYNTHESIS OF MODEL-REFERENCED ADAPTIVE CONTROL SYSTEMS.
Technical rept.,
Stanford Univ., Calif. Stanford Electronics Lab.
R. M. Dressler. Mar 66, 154p TR-6764-3, SU-SEL-66-004
Contracts DA-01-021-AMC-90015 (Y), Nonr-225 (83)

Descriptors: (*Adaptive control systems, Mathematical analysis), Synthesis, Differential equations, Errors, Optimization, Stability, Theory, Mathematical models, Simulation, Guided missiles (surface-to-air), Antimissile defense systems.
Identifiers: Nike - X, Lyapunov method.

An easily implemented adaption technique was derived analytically for the synthesis of model-referenced adaptive control systems. The simplicity of this technique gives it a distinct advantage over other techniques that have been described in the literature and makes it attractive for practical applications. The direct approach to the problem employs the state-space point of view. Solving the differential equations of the reference model and the adaptive control system leads to an expression showing the explicit functional dependence of the performance error on the adaptive parameters. Manipulation of the expression for performance error yields the adaption equations, which are very simple to implement. Model-referenced adaptive control systems utilizing this simplified adaption technique are investigated by means of an extensive stability analysis. Computer simulations are made to verify the various theoretical results obtained and to give some indication as to the performance capabilities of the simplified adaption technique. The model-referenced approach is shown to have application in the design of high-performance aircraft and missiles.
AD-483 444 HC$3.00 MF$0.65

BLUNT-NOSED MISSILE SHAPES OF MINIMUM BALLISTIC FACTOR.
Technical note,
Rice Univ Houston Tex
John C. Heideman. Feb 68, 14p
AFOSR-68-0504
Grant AF-AFOSR-828-67
Availability: Published in Journal of Optimization Theory and Applications, v1 n3 p242-52 Nov 1967.

Descriptors: (*Guided missiles, Optimization), Nose cones, Aerodynamic configurations, Slender bodies, Conical bodies, Pressure, Skin friction, Calculus of variations, Drag, Atmosphere entry, Aerodynamic heating, Angle of attack, Complex variables, Cyliedrical bodies.
Identifiers: Blunt bodies, Skin (Structural), Base pressure, Graphs (Charts).

The class of slender, axisymmetric missiles of given length, base radius, and specific weight is considered under the assumptions that the pressure distribution is modified Newtonian and the surface-averaged skin-friction coefficient is constant. The problem of minimizing the ballistic factor is formulated and solved via the calculus of variations for the case where the nose radius of the missile has a specified value, not necessarily zero. (Author)
AD-666 602 Not available from CFSTI.

BLACK BRANT ROCKETS AKF-3-26 AND AKF-3-27 LAUNCHED AT RESOLUTE BAY, OCTOBER 1967.
National Research Council of Canada, Ottawa (Ontario). Space Research Facilities Branch.
Jan 68, 36p SRFB-009

Descriptors: *Black brant sounding rockets, *Instrument packages, *Launch windows, *Onboard equipment, *Payloads, Absorption spectra, Cosmic rays, Plasma probes, Systems engineering.

For abstract, see STAR 06 09.
N68-18494 HC$3.00 MF$0.65

PRELIMINARY STUDY OF DRAG REDUCTION FOR COASTING MISSILES AT MACH NUMBERS FROM 1.57 TO 4.63.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
D. E. Fuller, and D. L. Wassum. Apr 68, 66p
NASA-TM-X-1537
Contract 126-13-02-01-23

Descriptors: *Coasting flight, *Drag reduction, *Missile configurations, Afterbodies, Closures, Conical bodies, Lift drag ratio, Scoops, Wind tunnel models.

For abstract, see STAR 06 09.
N68-19206 HC$3.00 MF$0.65

17. NAVIGATION, DETECTION, COMMUNICATIONS, AND COUNTERMEASURES

17A. Acoustic Detection

A SIMULATION PROGRAM FOR THE EVALUATION OF AN ASW MISSION.
Stanford Research Inst Menlo Park Calif
For primary bibliographic entry see Field 15A.
AD-666 812 HC$3.00 MF$0.65

17B. Communications

DYNAMIC ANALOG SPEECH SYNTHESIZER.
Massachusetts Inst. of Tech., Cambridge. Research Lab. of Electronics.
For primary bibliographic entry see Field 14E.
AD-251 764 HC$3.00

TELEPRINTER TT-567/AGC-X.
Interim engineering rept. no. 3, 25 Aug-25 Nov 67,
Lockheed-California Co Burbank
Carlyle Smith. 25 Jan 68, 32p
Contract NOw-66-0039
Availability: Microfiche only after original copies exhausted.

Descriptors: (*Teletype systems, Printing), Airborne, Specifications, Power supplies, Data processing systems, Reliability.
Identifiers: Teleprinters, AN/AGC-6.

The 'C' revision to the equipment specification 422800 was released. The present issue of the equipment specification differs from the previous one as follows. The interface signals with the associated equipment are now clarified in greater detail than heretofore, and the reliability tests are now covered by ES422895, Reliability Program Requirements for P-3C Teleprinter TT-567/AGC-6. The slides on the Teleprinter were changed to reflect a new installation of this equipment at the NAV-COMM station which is to mount the teletypewriter and teleprinter on a tray that will ride on rails. (Author)
AD-666 626 HC$3.00 MF$0.65

THE FRAMING PROBLEM IN BLOCK CODED FEEDBACK COMMUNICATIONS SYSTEMS.
Technical rept.,
State Univ of New York Stony Brook Coll of Engineering
Peter M. Dollard, and Jerome T. Waters. 24 Aug 66, 40p Rept nos. Scientific-2, TR-71
AFCRL-66-655
Contract AF 19 (628)-3865

Descriptors: (*Data transmission systems, Feedback), Synchronization (Electronics), Iterations, Errors, Coding, Communication systems.
Identifiers: Comma-free codes, Prefix codes, Coset codes.

The literature on word synchronization and framing of block coded binary transmission systems is reviewed in depth, with specific references to an extensive bibliography. Particular attention is paid to the use of comma-free codes derived from linear codes without added redundancy in such a way that the error control properties of the codes are fully retained. The review is directed towards the use of these techniques in a two way system with feedback, and includes a discussion of the special considerations which arise in this application. It is shown that all these techniques involve a substantial loss of ultimate information rate, and/or a substantial increase in system complexity over that required for error control alone. A modification of the comma-free codes is suggested in which iterated codes are employed to provide a sync grating intermediate between digit and word sync. This is shown to avoid much of the added complexity of comma-free codes, but at an additional cost in information rate. The report concludes with a brief discussion of still another technique which as yet has received too little attention. With this approach one does not seek absolute sync protection in the absence of channel errors, rather, one seeks highly reliable sync protection with the statistics of both source and channel taken into account. (Author)
AD-666 685 HC$3.00 MF$0.65

THE RADIO EMISSIONS FROM CLOSE LIGHTNING,
Stanford Research Inst Menlo Park Calif
For primary bibliographic entry see Field 4A.
AD-666 711 Not available from CFSTI.

SINGLE FREQUENCY F SUB 1, F SUB 1 REPEATER.
Final rept. 1 Jul-30 Nov 67,
Airborne Instruments Lab Deer Park N Y
G. Johnston, K. Redmond, and G. Thomson. Mar 68, 60p Rept no. AIL-2282-1
ECOM-0630-F
Contract DAAB07-67-C-0630, ARPA Order-694

Descriptors: (*Radio repeaters, Frequency modulation), Feasibility studies, Very high frequency, Broadband, Impedance matching, Tuned amplifiers, Microminiaturization (Electronics), Crystal filters, Portable, Linear systems, Desi n, Tactical warfare.
Identifiers: Hybrid circuits, Isolators (Electronics).

The objective of the study was to determine the feasibility of new technical concepts inherent in the design of F sub 1, F sub 1 repeaters. This technical report covers two novel versions of small F sub 1, F sub 1 radio repeaters designed for use with FM tactical transceivers. Both developmental models are linear, single frequency repeaters (F sub 1, F sub 1), one is high gain (50 db); the other wide-band (500 kHz). The design of these repeaters utilizes the concepts of hybrid isolation and precise antenna matching. The results indicate that true F sub 1, F sub 1 radio repeaters are feasible. Included are detailed discussions of: F sub 1, F sub 1 repeater concept; antenna matching and broadbanding techniques; hybrid isolation; amplifier and filter development; tests and evaluation; miniaturization; future trends and goals. (Author)
AD-666 781 HC$3.00 MF$0.65

VALUE ENGINEERING FINAL REPORT FOR LIGHT OBSERVATION HELICOPTER AVIONICS PACKAGE.
Sylvania Electronic Systems-Central Williamsville N Y
For primary bibliographic entry see Field 1C.
AD-666 792 HC$3.00 MF$0.65

PROCEEDINGS OF THE OAR RESEARCH APPLICATIONS CONFERENCE, 21 MARCH 1968. VOLUME I.
Institute for Defense Analyses Arlington Va
For primary bibliographic entry see Field 5B.
AD-666 800 HC$3.00 MF$0.65

MAXIMAL-RATIO DIVERSITY COMBINERS,
Hawaii Univ Honolulu Dept of Electrical Engineering
For primary bibliographic entry see Field 9D.
AD-666 860 Not available from CFSTI.

DYNAMIC BANDWIDTH OF PHASE-MODULATED SIGNALS.
Rept. for Aug-Oct 67,
Aerospace Corp El Segundo Calif Lab Operations
A. W. Rihaczek. Feb 68, 30p Rept no. TR-0158 (3230-46)-4
SAMSO-TR-68-102
Contract F04695-67-C-0158

Descriptors: (*Phase modulation, Radio signals), (*Radio signals, Bandwidth), Time, Frequency modulation, Fourier analysis, Integral transforms, Electric filters, Phase-locked systems, Noise (Radio).
Identifiers: *Waveform analysis.

A method of signal representation is introduced which simplifies the analysis and provides a better understanding of systems using phase-modulated signals. To replace time function and spectrum, the concept of instantaneous frequency is supplemented by that of dynamic bandwidth. Instantaneous frequency indicates in which part of the spectrum the signal energy is concentrated at a particular time, whereas dynamic bandwidth measures the degree of concentration. The combination of both concepts reveals the nature of a phase-modulated signal in a manner in better agreement with physical intuition than time function and frequency spectrum. A signal with arbitrary phase modulation can be thought of as a succession of elementary constant-carrier pulses of varying duration; or, in the frequency domain, as a succession of spectral bands with linear phase and varying widths.

It is shown that this approach permits one to write down results that would take a complicated analysis if conventional methods were used. (Author)
AD-666 915 HC$3.00 MF$0.65

A LINEAR PROGRAMMING FORMULATION OF COMMUNICATION NETWORKS WITH MEMORY.
Interim rept.,
Northwestern Univ Evanston Ill Dept of Electrical Engineering
S. L. Hakimi. Mar 68, 7p
AFOSR-68-0550
Contract N00014-66-A-0020-A03, Grant AF-AFOSR-98-65
Availability: Published in Proceedings of Princeton Conference on Systems and Information Science, 7p Mar 67.

Descriptors: (*Communication systems, Mathematical models), (*Mathematical models, Linear programming), Storage, Networks, Traffic, Matrix algebra, Optimization, Statistical processe l, Digital computers, Symposia.

A mathematical formulation of the communication networks with memory is presented assuming that the sources of traffic are deterministic but not necessarily time invariant. The formulations leads to a linear programming problem. Some generalizations and justifications of the choice of the model are discussed. The same basic formulation can be used as a tool for analysis as well as least-cost design or improvement of an existing network. (Author)
AD-667 095 Not available from CFSTI.

INVESTIGATIONS OF BROADBAND FERROMAGNETIC POWER LIMITERS AND EXPANDERS AS DUPLEXING ELEMENTS FOR MICROWAVE SYSTEMS.
Microwave Electronics, Palo Alto, Calif.
For primary bibliographic entry see Field 9E.
AD-816 274 HC$3.00 MF$0.65

STUDY AND APPLICATIONS OF RETRODIRECTIVE AND SELF ADAPTIVE ELECTROMAGNETIC-WAVE PHASE CONTROLS TO A MARS PROBE.
Stanford Research Inst., Menlo Park, Calif.
R. B. Battelle, C. H. Dawson, C. A. Hacking, R. C. Kunzelman, and J. A. Martin. Mar 68, 231p NASA-CR-977
Contract NAS2-2933
Coll- 231 P Refs

Descriptors: *Antenna arrays, *Computer programs, *Interplanetary spacecraft, *Mars probes, *Phase control, *Retroreflection, *Self adaptive control systems, Mars (planet), Numerical analysis, Telecommunication.

For abstract, see STAR 06 09.
N68-18484 HC$3.00 MF$0.65

RADAR ATTENUATION MEASUREMENTS FINAL REPORT, 16 NOV. 1964 - 15 MAY 1965.
Thiokol Chemical Corp., Huntsville, Ala.
G. W. Sanford. 14 May 65, 52p NASA-CR-61625, REPT.-34-65
Contract NAS8-11635

Descriptors: *Exhaust gases, *Radar attenuation, *Radio frequency interference, *Rocket engines, Ionized gases, Microwave equipment, Microwave frequencies, Oscillographs, Static firing.

For abstract, see STAR 06 09.
N68-18664 HC$3.00 MF$0.65

INSTRUCTION MANUAL FOR IONOSPHERIC DRIFT MEASUREMENTS. THE DETERMINATION OF IONOSPHERIC DRIFTS FROM THREE-RECEIVER FADING RECORDS.
Adelaide Univ. (Australia). Dept. of Physics.
For primary bibliographic entry see Field 4A.
For abstract, see STAR 06 09.
N68-18905 HC$3.00 MF$0.65

VOYAGER SPACECRAFT PHASE B, TASK D. VOLUME 2 - SYSTEM DESCRIPTION. BOOK 2 - TELECOMMUNICATION FINAL REPORT.
General Electric Co., Philadelphia, Pa. Missile and Space Div.
For primary bibliographic entry see Field 22B.
For abstract, see STAR 06 09.
N68-19102 HC$3.00 MF$0.65

VIDEO DATA MODULATION STUDY, VOLUME I FINAL REPORT.
Electro-mechanical Research, Inc., Sarasota, Fla. Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
J. K. Fadely, B. C. King, J. M. Knight, A. E. Pieper, and G. L. Raga. 31 Jul 64, 241p NASA-CR-93568
Contracts NAS7-100, JPL-950705
Prep- Prepared for Jpl

Descriptors: *Data transmission, *Imaging techniques, *Modulation, *Video data, Coding, Computer programs, Data processing, Digital data, Display devices, Error analysis, Signal to noise ratios, Systems analysis, Video equipment.

For abstract, see STAR 06 09.
N68-19149 HC$3.00 MF$0.65

TWO-WAY RADIO COMMUNICATION MASS TRANSPORTATION DEMONSTRATION PROJECT.
New York City Transit Authority.
For primary bibliographic entry see Field 13F.
PB-177 048 HC$3.00 MF$0.65

17C. Direction Finding

STUDY OF BROAD-BAND AMPLITUDE-COMPARISON METHODS FOR ACCURATE MICROWAVE DIRECTION FINDING IN A SECTOR,
Royal Aircraft Establishment Farnborough (England)
N. A. D. Pavey. Oct 67, 47p Rept no. RAE-TR-67271

Descriptors: (*Direction finding, Microwaves), Angle of arrival, Azimuth, Broadband, Microwave equipment, Signal-to-noise ratio, Noise (Radio), Synthesis, Pulse systems, Detectors, Errors, Sensitivity, Accuracy, Great Britain.
Identifiers: Graphs (Charts).

Frequency invariant aerial radiation patterns are ideally required in two-channel amplitude-comparison systems for accurate direction finding over bandwidths approaching an octave. Optimum radiation patterns are not practically realisable, but reasonable approximations to these may be synthesised using multiple narrow beams. The design of a 6-beam detector-video system for determining the angle of arrival of a single pulse signal within an 8 degree sector is considered and sources of D.F. error are analysed. An overall D.F. error of 0.2 degree rms is estimated due to systematic effects. Voltage signal-to-noise ratios of greater than 150:1 are necessary to minimise further D.F. degradation due to thermal noise. Alternative signal processing studies are planned. (Author)
AD-666 955 HC$3.00 MF$0.65

17E. Infrared and Ultraviolet Detection

SPATIAL FREQUENCY FILTERING.
IRIA State-of-the-art rept.,
Michigan Univ., Ann Arbor. Inst. of Science and Technology.
James L. Alward. Dec 65, 131p Rept. no. 2389-87-T
Contracts Nonr-1224 (12), Nonr-1224 (52)

Descriptors: (*Infrared detectors, Filters (Electromagnetic wave)), (*Optics, Optical filters), Integral transforms, Infrared images, Mathematical analysis, Reticles, Mathematical models, Functions, Fourier analysis, Probability, Optical images, Geometry, Infrared scanning, Frequency, Integrals, Density, Delay lines, Optimization, Infrared optical systems, Time, Electromagnetic waves, Matched filters, Correlation techniques, State-of-the-art reviews, Transfer functions.
Identifiers: Spatial frequency filtering.

The basic approaches to the analysis of image-plane spatial filtering are discussed. A review of fourier transforms and transfer function analysis is given; expressions for the time-dependent output of several reticle devices are calculated; background measurements intended for use with transfer-function spatial filter analysis are reviewed; and two approaches to frequency-domain optimization of spatial filters are discussed. (Author)
AD-480 352 HC$3.00 MF$0.65

SINGLE CHANNEL AIRBORNE INFRARED RADIOMETER FINAL REPORT.
Block Engineering, Inc., Cambridge, Mass.
H. De Weerd. 4 Jan 68, 22p NASA-CR-92009
Contract NAS9-6817

Descriptors: *Absorbers (materials), *Black body radiation, *Calibrating, *Infrared instruments, *Radiometers, Accuracy, Electric choppers, Lenses, Optical filters.

For abstract, see STAR 06 09.
N68-19309 HC$3.00 MF$0.65

COMPUTER REDUCTION AND ANALYSIS OF AN INFRARED IMAGE.
Stanford Univ., Calif. Remote Sensing Lab.
K. Lee. 31 Dec 67, 53p NASA-CR-93697, SU-RSL-TECH-67-4
Contract NGR-05-020-115

Descriptors: *Computer programs, *Data reduction, *Digital techniques, *Infrared scanners, Fortran, Ibm 7090 computer, Imaging techniques, Isothermal processes, Photographic film, Temperature gradients.

For abstract, see STAR 06 09.
N68-19332 HC$3.00 MF$0.65

17G. Navigation and Guidance

A SIMPLIFIED TECHNIQUE FOR THE SYNTHESIS OF MODEL-REFERENCED ADAPTIVE CONTROL SYSTEMS.
Stanford Univ., Calif. Stanford Electroeics Lab.
For primary bibliographic entry see Field 16D.
AD-483 444 HC$3.00 MF$0.65

UNINTERRUPTIBLE POWER SYSTEM MODULE ANALYSIS.
Gbrrett Corp Torrance Calif Airesearch Mfg Div
For primary bibliographic entry see Field 10B.
AD-666 823 HC$3.00 MF$0.65

PRECISION VOR. VOLUME III. PVOR (M) MONITOR HANDBOOK.
Final rept.,
Airborne Instruments Lab Deer Park N Y
E. Hollm, R. Mesard, and M. Zeltser. Aug 67, 4p
FAA-RD-67-58-Vol-3
Contract FA-65-WA-1058
See also Volume no. 2, AD-666 576.

Descriptors: (*Radio navigation, Monitors), Handbooks, Radio equipment, Antennas, Radio signals, Phase-locked systems, Instruction manuals.

Identifiers: VOR, Ground stations, *Precision multilobe VOR systems.

The instruction manual is for a monitor unit designed and built to be used in conjunction with slightly modified conventional VOR monitor. It employs phase-lock loops to extract the precision signals and a programmed selector unit to sequence among eight field detectors in order to detect any conceivable ground-station fault. (Author)
AD-666 967 HC$3.00 MF$0.65

INTENSITY MEASUREMENTS OF FA-240 RANGE LIGHT.
Test rept.,
Coast Guard Baltimore Md Field Testing and Development Center
L. R. Lomer. 20 Mar 68, 13p Rept no. 474

Descriptors: (*Navigational lights, Intensity), Measurement, Lenses, Colors, Glass, Acrylic resins, Acceptability, Optical properties, Test methods, Marker lights.
Identifiers: *Range lights, Beam divergence.

Tests were conducted to determine peak steady burning intensity, beam divergeece bnd chromaticity of the Wallace and Tiernan FA-240 Range Light. Data is listed for combinations of the five standard 12-volt marine signal lamps used with clear, red and green - 3.5 degrees, 8 degrees and 30 degrees spread lenses. (Author)
AD-666 980 HC$3.00 MF$0.65

EFFECTS OF BIAS ERRORS ON INTERPLANETARY NAVIGATION AND GUIDANCE SYSTEM PERFORMANCE.
Philco-ford Corp., Palo Alto, Calif. Space and Reentry Systems Div.
P. J. Rohde. 11 Aug 67, 168p NASA-CR-61599, SRS-TR-148
Contract NAS8-20358

Descriptors: *Bias, *Errors, *Interplanetary navigation, *Midcourse guidance, Computer programs, Earth-mars trajectories, Equations of motion, Kalman-schmidt filtering, Optimization.

For abstract, see STAR 06 09.
N68-18726 HC$3.00 MF$0.65

SATURN 5 MANUAL BACKUP GUIDANCE AND CONTROL PILOTED SIMULATION STUDY.
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
G. H. Hardy, and R. L. Kurkowski. Mar 68, 29p NASA-TN-D-4481
Contract 125-19-01-32-00-21

Descriptors: *Attitude control, *Flight control, *Guidance (motion), *Manual control, *Saturn 5 launch vehicles, Backups, Command and control, Flight simulation.

For abstract, see STAR 06 09.
N68-19061 HC$3.00 MF$0.65

ESTIMATION OF INERTIAL PLATFORM ERRORS.
Philco-ford Corp., Palo Alto, Calif. Space and Reentry Systems Div.
J. V. Brown, and J. S. Tyler, Jr.. 21 Oct 67, 117p NASA-CR-61645, TR-DA1569
Contract NAS8-20358

Descriptors: *Dynamic models, *Error analysis, *Inertial platforms, *Mathematical models, Minimum variance orbit determination, Random errors, Trajectory measurement.

For abstract, see STAR 06 09.
N68-19163 HC$3.00 MF$0.65

CENTAUR IN RETROSPECT - A TECHNICAL SURVEY OF THE CENTAUR INERTIAL GUIDANCE SYSTEM EVOLUTION FROM 1959 TO 1967.
Honeywell, Inc., St. Petersburg, Fla. Aerospace Div.
For primary bibliographic entry see Field 22D.
For abstract, see STAR 06 09.
N68-19164 HC$3.00 MF$0.65

SIMPLE PROCESSORS OF STAR TRACKER COMMANDS FOR STABILIZING AN INERTIALLY ORIENTED SATELLITE.
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
B. F. Doolin, R. D. Showman, and G. M. Sullivan. Mar 68, 66p NASA-TN-D-4490
Contract 125-19-03-06-00-21

Descriptors: *Inertial reference systems, *Satellite attitude control, *Spacecraft stability, *Star trackers, Attitude indicators, Attitude stability, Equations of motion, Gimbals, Moments of inertia.

For abstract, see STAR 06 09.
N68-19236 HC$3.00 MF$0.65

DESIGN OF STRAPDOWN GYROSCOPES FOR A DYNAMIC ENVIRONMENT INTERIM SCIENTIFIC REPORT.
Analytic Sciences Corp., Winchester, Mass.
A. Gelb, and A. A. Sutherland, Jr.. 15 Jan 68, 174p NASA-CR-86037, TR-101-2
Contract NAS12-508

Descriptors: *Error analysis, *Figure of merit, *Gyroscopes, *Inertial reference systems, Angular velocity, Degrees of freedom, Gimbals, Gyroscopic stability, Mathematical models, Torque.

For abstract, see STAR 06 09.
N68-19240 HC$3.00 MF$0.65

VEHICLE ATTITUDE DETERMINATION WITH A SINGLE ONBOARD CAMERA.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
R. J. Bendura, A. B. Henning, and R. E. Smith, Jr.. Mar 68, 27p NASA-TN-D-4359
Contract 124-07-03-05-23

Descriptors: *Attitude indicators, *High speed cameras, *Motion pictures, *Onboard equipment, *Spacecraft instruments, Data processing, Data reduction, Photogrammetry, Postflight analysis, Spaceborne photography.

For abstract, see STAR 06 09.
N68-19275 HC$3.00 MF$0.65

APPLICATIONS FOR INERTIAL SENSORS IN SPACE.
National Aeronautics and Space Administration, Washington, D. C.
J. Ranter. 1966, 12p NASA-TM-X-57531
Conf- Presented At the Inst. of Navigation, Boston, 21 Apr. 1966

Descriptors: *Inertial guidance, *Inertial platforms, *Inertial reference systems, Accelerometers, Attitude control, Gyroscopes, Onboard equipment, Spacecraft guidance.

For abstract, see STAR 06 09.
N68-19428 HC$3.00 MF$0.65

LUNAR NAVIGATION STUDY, VOLUME 2 FINAL REPORT, JAN. - DEC. 1966.
Bendix Corp., Ann Arbor, Mich.
For primary bibliographic entry see Field 22A.
For abstract, see STAR 06 09.
N68-19456 HC$3.00 MF$0.65

17H. Optical Detection

JUNGLE VISION V: EVALUATION OF THREE TYPES OF LENSES AS AIDS TO PERSONNEL DETECTION IN A SEMIDECIDUOUS TROPICAL FOREST.
Research rept.,
Army Tropic Test Center, Fort Clayton (Canal Zone).
D. A. Dobbins, and C. M. Kindick. Dec 65, 43p RR-5
See also Research report no. 8, AD-649 843.

Descriptors: (*Detection, Enemy personnel), (*Jungles, Vision), Optical equipment, Lenses, Optical filters, Target acquisition, Performance (Human), Illumination, Tests.

The purpose of this study was to evaluate nonmagnifying yellow, red, and dichroid lenses as aids to personnel detection in a tropical semideciduous forest. Twenty-four US infantry soldiers with normal visual acuity were selected as observers, four subgroups of six EM each were then assigned to observe either with yellow lenses, red lenses, dichroic lenses or unaided vision, each observer was presented 40 randomly appearing human targets in fatigue uniforms who stood motionless within a 180 degree horizontal field of search. None of the lenses facilitated target detectability as measured by 50% visual thresholds, visibility gradients, or total detections when compared to unaided vision. Furthermore, no significant differences among modes of observation were found for target search time, perceived target distance, or practice gradients. Considerable difficulty was experienced with the condensation of moisture on the insides of lenses fitted both in spectacle and goggle type frames.
AD-481 177 HC$3.00 MF$0.65

JUNGLE VISION VI: A COMPARISON BETWEEN THE DETECTABILITY OF HUMAN TARGETS AND STANDARD VISIBILITY OBJECTS IN AN EVERGREEN RAINFOREST.
Research rept.,
Army Tropic Test Center, Fort Clayton (Canal Zone).
D. A. Dobbins, and C. M. Kindick. Feb 66, 48p RR-6

Descriptors: (*Detection, Enemy personnel), (*Jungles, Vision), Performance (Human), Target acquisition, Visibility, Measurement, Camouflage, Clothing, Colors, Illumination.

Twenty US infantry soldiers with normal vision were presented 108 targets at distances ranging from 30 feet to 120 feet on two sites in a canal zone evergreen rainforest. Observers were presented 18 each of the following targets: Olive drab silhouettes, olive drab cylinders, double white discs, single white discs, silhouettes camouflaged by the USAERDL four-color 1948 pattern, and human targets in fatigue uniforms. Comparisons between human targets and standard visibility objects were made using four criteria: 50% detection thresholds, total number of detections, visibility gradients, and observer response variability, quantitative comparisons showed that both the olive drab silhouette and the olive drab cylinder closely approximated the detectability of the human targets; of the two objects, the silhouette was considered superior. The USAERDL four-color camouflage cloth effectively and significantly reduced detections by ground observers in jungle vegetation.
AD-481 178 HC$3.00 MF$0.65

17I. Radar Detection

OPTIMUM SEARCH FOR OBJECTS HAVING UNKNOWN ARRIVAL TIMES,
Sylvania Electronic Systems-West, Mountain View, Calif. Electronic Defense Labs.
For primary bibliographic entry see Field 16D.
AD-208 306 HC$3.00

HIGH-FREQUENCY MEASUREMENT OF RADAR CROSS SECTION USING THE STANDING-WAVE METHOD.
Technical rept.,
Stanford Univ., Calif. Stanford Electronics Lab.
J. G. Steele, and J. R. Barnum. Mar 66, 68p SU-SEL-66-021, TR-127
Contract Nonr-225 (64), ARPA Order-196-65

Descriptors: (*Radar echo areas, *Target discrimination), (*Standing wave indicators, Radar echo areas), Radar targets, High frequency, Aluminum, Backscattering, Trees, Height finding, Terrain, Polarization, Vehicles, Ranges (distance), Standing wave ratios.

The standing-wave method of measuring radar cross sections has been adapted for use at 26 Mc. A target in the middle of a large flat field was illuminated by a transmitter 300 ft away, and a probe was moved along the transmitter-target line to measure the amplitude and position of the standing wave due to the target. Aluminum dipoles of different lengths were first used as targets, and a correction was applied to the results to take account of any nonuniform illumination of the targets. Both the target cross section and the phase of the scattered radiation varied with the target length in the same way as that predicted from microwave measurements. The results demonstrate the validity of extrapolating microwave measurements to the high-frequency part of the spectrum. Calibration of the system was achieved by using the known cross section of a half-wave dipole. The technique was used to measure cross sections of trees and other objects, and in some cases the effective height of an irregularly shaped tree could be deduced.
AD-481 748 HC$3.00 MF$0.65

FOUR METHODS OF SOLVING FOR THE SPHERICAL ERROR PROBABLE ASSOCIATED WITH A THREE-DIMENSIONAL NORMAL DISTRIBUTION.
Technical rept.,
Air Force Missile Development Center Holloman AFB N Mex
Richard J. Schulte, and Donald W. Dickinson. Jan 68, 58p Rept no. MDC-TR-68-12

Descriptors: (*Satellites (Artificial), Position finding), (*Position finding, Uncertainty), Radar tracking, Statistical analysis, Probability, Iterative methods, Mathematical prediction, Computer programs.
Identifiers: Spherical error probable.

When the predicted position of a satellite contains normally distributed errors, the position uncertainty can be described by a Spherical Error Probable or SEP. The SEP is calculated by integrating the three-dimensional normal probability density function over a spherical volume. The SEP is set equal to the radius of that volume which contains the satellite with 50% probability. In this report the authors present four methods for integrating the density function and finding the SEP. The three normal variates in the density function are assumed to be independent and unbiased with known variances. (Author)
AD-666 646 HC$3.00 MF$0.65

MATCHED-FILTER RESPONSES OF THE LINEAR FM WAVEFORM.
Rept. for Sep 66-Jun 67,
Aerospace Corp El Segundo Calif Lab Operations
R. L. Mitchell, and A. W. Rihaczek. Nov 67, 49p Rept no. TR-0158 (3230-46)-6
SAMSO-TR-68-104
Contract F04695-67-C-0158

Descriptors: (*Radar signals, Filters (Electromagnetic wave)), Frequency modulation, Radar pulses, Doppler effect, Ranges (Distance), Velocity, Acceleration, Bandwidth, Time, Matched filters, Numerical methods bnd procedures.
Identifiers: Graphs (Charts).

Although the properties of the linear FM signal have been studied previously in considerable detail, such studies have involved rather narrow aspects of the theory. This paper extends the work in several respects. By presenting three-dimensional plots of the conventional ambiguity function of the linear FM signal in more detail than available before, we can study the sidelobe behavior off as well as on the axes, without weighting, with unilateral weighting in the receiver, and with bilateral weighting. These plots reveal interesting properties related to the signal symmetry in time and frequency. The matched-filter response then is extended to include Doppler distortions of the modulation function. Plots of the response are presented for various degrees of distortion, for signals with and without weighting. Lastly, we consider the effects of a mismatch in range acceleration, again for the various cases of interest. The results convey a thorough insight into the properties of Chirp radar under a broad range of operational conditions. (Author)
AD-666 661 HC$3.00 MF$0.65

GENERAL RESEARCH.
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 5B.
AD-666 712 HC$3.00 MF$0.65

PARAMETER ESTIMATION FOR STOCHASTIC SIGNALS WHICH ARE COHERENT IN PAIRS,
Michigan Univ Ann Arbor Inst of Science and Technology
For primary bibliographic entry see Field 9D.
AD-666 777 HC$3.00 MF$0.65

ON RADAR AMBIGUITY FUNCTIONS INCLUDING ANGLE AND ANGLE-RATE,
Royal Aircraft Establishment Farnborough (England)
P. W. James. Oct 67, 24p Rept no. RAE-TR-67266

Descriptors: (*Radar signals, Mathematical analysis), Radar equipment, Tuning devices, Ranges (Distance), Angle of arrival, Multiple operation, Resolution, Direction finding, Radar receivers.
Identifiers: Simultaneous reception (Radar), Ambiguity functions.

The purpose of the report is to develop an ambiguity function depending on the angle of arrival of a signal, and on the rate of change of angle; and to explore some of its properties. (Author)
AD-667 032 HC$3.00 MF$0.65

VEGETATION ANALYSIS WITH RADAR IMAGERY.
Kansas Univ., Lawrence. Engineering Science Div.
For primary bibliographic entry see Field 2F.
For abstract, see STAR 06 09.
N68-19214 HC$3.00 MF$0.65

IONOSPHERIC DISTORTION OF MINITRACK SIGNALS IN SOUTH AMERICA.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
T. Golden. Feb 68, 37p NASA-TM-X-63136, X-525-68-56

Descriptors: *Ionospheric propagation, *Minitrack system, *South america, Diurnal variations, Ionospheric sounding, Propagation modes, Radio frequency interference, Satellite tracking, Stadan (satellite tracking network), Telemetry.

For abstract, see STAR 06 09.
N68-19383 HC$3.00 MF$0.65

17J. Seismic Detection

VIGILANCE PERFORMANCE AS A FUNCTION OF TASK AND ENVIRONMENTAL VARIABLES.
George Washington Univ., Alexandria, Va. Human Resources Research Office.
For primary bibliographic entry see Field 5J.
AD-404 212 HC$3.00

18. NUCLEAR SCIENCES AND TECHNOLOGY

18B. Isotopes

THE NEW RADIOSOTOPE 99Ag AND SOME MEASUREMENTS ON 100Ag,
California Univ Los Angeles
Duane R. Doty, J. Reginald Richardson, and Jules W. Sunier. 1967, 10p
Contract Nonr-233 (44)
Availability: Published in Nuclear Physics A103 p417-26 1967.

Descriptors: (*Silver, *Radioactive isotopes), Palladium, Proton bombardment, Radioactive decay, Half life, Nuclear spectroscopy, Nuclear energy levels, Isomeric transitions.

Production of 99Ag with a (p, 4n) reaction on 102Pd targets was observed. A half-life of 106 plus or minus 10 sec was measured for gamma transition at 660 (30), 750 (15), 1040 (100), 1525 (30), 1700 (90) and 3315 (35) keV. The growth and decay of the daughter 99Pd was observed. A position spectrum was resolved into three branches at 3.32 (59.2), 2.43 (23.9) and 1.69 (16.9) MeV. A level scheme is proposed for the levels in 99Pd. A high-energy position branch at 6.5 plus or minus 0.5 MeV with a 7.5 plus or minus 1 min half-life was observed and is ascribed to 100Ag. The threshold for this production indicates a (p, 3n) reaction. In addition, two intense gamma transitions at 556 and 728 keV with the same half-life are ascribed to the decay of 100Ag. (Author)
AD-666 886 Not available from CFSTI.

THE RADIONUCLEIDE 101Ag,
California Univ Los Angeles
Duane R. Doty, P. Charoenkwan, J. W. Sunier, and J. Reginald Richardson. 1967, 13p
Contract Nonr-233 (44)
Availability: Published in Nuclear Physics, vA103 p404-16 1967.

Descriptors: (*Silver, *Radioactive isotopes), Palladium, Proton bombardment, Radioactive decay, Half life, Nuclear spectroscopy, Nuclear energy levels, Gamma emission, Coincidence counting.

Production of 101Ag with a (p, 2n) reaction on 102Pd targets was observed. A half-life of 10.8 plus or minus 0.2 min was measured for the new isotope, and the subsequent growth and decay of its daughter 101Pd was detected. A complex positon spectrum was resolved into energies and intensities of 3.38 MeV (10.0%), 2.73 MeV (43.6%), 2.18 MeV (22.6%), 1.56 MeV (17%), 1.08 MeV (6.2%) and 0.85 MeV (0.6%). Nine gamma transitions from 83 keV to 1164 keV were identified as belonging to the decay of 101Ag. The most intense gamma transition at 263 keV is fed by the high-energy positon branch and establishes the energy available for decay at 4.665 plus or minus 0.08 MeV. A level scheme is proposed with a positive parity assignment for the first excited energy level in 101Pd. (Author)
AD-667 108 Not available from CFSTI.

PROJECTED LARGE SCALE USE OF RADIOISOTOPES BY NASA.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
R. E. English. 1966, 12p NASA-TM-X-52187

Conf- Presented At Am. Nucl. Soc. Meeting on Large Scale Production and Appl. of Radioisotopes, Augusta, Ga., 23 Mar. 1966

Descriptors: *Brayton cycle, *Heat radiators, *Heat sources, *Radiation hazards, *Radioactive isotopes, Heat sinks, Radiation shielding.

For abstract, see STAR 06 09.
N68-19029 HC$3.00 MF$0.65

18C. Nuclear Explosions

A STUDY OF TWO SHORT-PERIOD DISCRIMINANTS.
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 8K.
AD-666 701 HC$3.00 MF$0.65

TAPE RECORDING OF EARLY NUCLEAR WEAPON PHENOMENA,
Harry Diamond Labs Washington D C
For primary bibliographic entry see Field 14C.
AD-666 755 HC$3.00 MF$0.65

AN ESTIMATION OF THE PERSONNEL HAZARDS FROM A MULTI-TON BLAST IN A CONIFEROUS FOREST.
Final rept.,
Lovelace Foundation for Medical Education and Research Albuquerque N Mex
E. R. Fletcher, D. R. Richmond, I. G. Bowen, and C. S. White. Nov 67, 51p
DASA-2020
Contract DA-49-146-XZ-485

Descriptors: (*Nuclear explosions, Hazards), (*TNT, Surface burst), Simulation, Surface area, Exposure, Pressure, Ranges (Distance), Anthropometry, Detonation waves, Shock waves, Laboratory animals, Explosion effects, Wave transmission, Damage, Trees, Blast, Personnel, Nuclear explosion damage.
Identifiers: Primary blast, Secondary blast, Tertiary blast, Distant plain operation, Coniferous forest, Overpressure.

Experiments are described which took place in a managed coniferous forest at various ranges from a 50-ton TNT surface burst. The secondary blast hazard to personnel was estimated as a function of range and type of exposure. The tertiary blast hazards were estimated using the measured blast wave parameters and a mathematical model of translation. Six anthropomorphic dummies were placed in the forest to obtain total displacements and partially verify the translation model. The primary blast hazard was estimated from the measured blast wave parameters and earlier studies involving several mammalian species. Measured steel-sphere velocities were used to verify the translational model and to estimate the positive dynamic-pressure impulses at three ranges in the forest and in the cleared sector. (Author)
AD-666 822 HC$3.00 MF$0.65

NUCLEAR EXPLOSIONS IN AN IONOSPHERE WITH FINITE ELECTRIC CONDUCTIVITY IN THE PRESENCE OF A UNIFORM MAGNETIC FIELD.
Innsbruck Univ. (Austria). Inst. for Theoretical Physics.
F. Cap, and N. Rimer. 5 Nov 68, 36p SR-52, AFOSR-68-0148
Contract F61052-67-C-0014

Descriptors: *Electrical resistivity, *Ionosphere, *Magnetic fields, *Nuclear explosions, Bubbles, Flow theory, Shock waves, Uniform flow.

For abstract, see STAR 06 09.
N68-18284 HC$3.00 MF$0.65

18D. Nuclear Instrumentation

BIBLIOGRAPHY ON SEMICONDUCTOR DETECTORS - A COMPILATION OF SELECTED LITERATURE ABSTRACTS AS GUIDE TO RECENTLY PUBLIC AVAILABLE R AND D PUBLICATIONS IN SEMICONDUCTOR RADIATION DETECTOR TECHNIQUES COVERING THE PERIOD 1963-1967.
European Atomic Energy Community, Dessel (Belgium).
E. Bock. Dec 67, 135p EUR-3630.E

Descriptors: *Bibliographies, *Radiation detectors, *Semiconductor devices, Abstracts, Indexes (documentation), Literature, Radiation counters, Semiconductors (materials), Solid state physics.

For abstract, see STAR 06 09.
N68-18963 HC$3.00-MF$0.65

SOLAR WIND SPECTROMETER PROJECT FINAL REPORT, APR. 1966 - JAN. 1968.
Electro-optical Systems, Inc., Pasadena, Calif. Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
For primary bibliographic entry see Field 14B.
For abstract, see STAR 06 09.
N68-19385 HC$3.00 MF$0.65

18F. Radiation Shielding and Protection

MUNDO - A DIGITAL PROGRAM FOR CALCULATION OF ACCIDENT RATES IN THE ENVIRONMENT OF A REACTOR INSTALLATION.
Mundo - Digital Programm Zur Berechchnung Von Unfalldosen in Der Umgebung Einer Reaktoranlage
Kernforschungszentrum, Karlsruhe (West Germany). Institut Fuer Angewandte Reaktorphysik.
F. Heller, W. Schikarski, and A. Wickenhaeuser. Sep 67, 37p KFK-653, EUR-3684.D
Lang- in German Spon- Sponsored By Euratom

Descriptors: *Computer programs, *Radiation dosage, *Reactor safety, Accidents, Digital computers, Fortran, Nuclear fission, Nuclear fuel elements, Nuclear reactors, Radiation hazards, Radiation shielding, Radioactive isotopes.

For abstract, see STAR 06 09.
N68-18944 HC$3.00 MF$0.65

THE PRINCIPLE OF DOUBLE CONTAINMENT AND THE BEHAVIOUR OF AEROSOLS IN ITS RELATION TO THE SAFETY OF REACTORS WITH A HIGH PLUTONIUM INVENTORY.
Kernforschungszentrum, Karlsruhe (West Germany). Institut Fuer Angewandte Reaktorphysik.
W. Haefele, F. Heller, and W. Schikarski. Oct 67, 19p KFK-669, EUR-3702.E
Spon- Sponsored By Euratom

Descriptors: *Aerosols, *Breeder reactors, *Containment, *Plutonium isotopes, *Sodium cooling, Fission products, Iodine isotopes, Radiation dosage, Reactor safety.

For abstract, see STAR 06 09.
N68-18957 HC$3.00 MF$0.65

BIBLIOGRAPHY, SUBJECT INDEX, AND AUTHOR INDEX OF THE LITERATURE EXAMINED BY THE RADIATION SHIELDING INFORMATION CENTER - SPACE AND ACCELERATOR SHIELDING.
Oak Ridge National Lab., Tenn. Radiation Shielding Information Center.
J. Gurney. Sep 67, 119p NASA-CR-75316, ORNL-RSIC-11, REV. 1
NASA ORDER R-104/10/
Rean- Revised

Descriptors: *Bibliographies, *Radiation shielding, *Radiation sources, *Scattering cross sections, Indexes (documentation), Literature, Neutron cross sections, Nuclear research, Particle energy, Particle motion, Radiation effects.

For abstract, see STAR 06 09.
N68-18981 HC$3.00 MF$0.65

18G. Radioactive Wastes and Fission Products

SITE SURVEILLANCE WITH EURATOM JRC AT ISPRA.
Sorveglianza Del Sito All'interno Del C.C.R. Euratom Ispra
European Atomic Energy Community, Ispra (Italy).
M. De Bortoli, and P. Gaglione. Feb 68, 42p EUR-3884.I
Refs Lang- in Italian, English Summary

Descriptors: *Nuclear reactors, *Radioactive contaminants, *Research facilities, *Surveys, Fallout, Nuclear research, Radiation hazards, Reactor safety, Sites.

For abstract, see STAR 06 09.
N68-19014 HC$3.00 MF$0.65

18H. Radioactivity

GAMMA DETECTING-INDICATING SYSTEM, AN/GKQ-4.
Technical rept. 18 Apr 63-15 Jun 67,
Air Force Weapons Lab Kirtland AFB N Mex
E. G. Clements, and P. A. Zielie. Mar 68, 16p
Rept no. AFWL-TR-68-22

Descriptors: (*Radioactive fallout, Monitors), Gamma rays, Detection, Telemeter systems, Radio communication systems, Dose rate, Intensity, Radiation alarms, Ionization chambers, Data transmission systems, Display systems, Remote control systems.
Identifiers: AN/GKQ-4.

The preliminary report describes the capabilities and operation of a prototype, wide-area, remote fallout monitor developed by the United States Air Force. This system is capable of detecting gamma intensities in a range of from 0.01 to 5000 R/hr, at up to 10 remote detecting locations, and transmitting this information by hard-line or radio telemetry to a single central location. The central station displays dose-rate information on individual meters and a single-strip chart recorder. An audio and visual alarm is given when a pre-set dose rate is reached. The system is able to operate on either 117 Vac, 60 Hz, or self-contained, rechargeable battery power in case of power failure. The final report will contain information concerning the development, design, and fabrication of this system. (Author)
AD-666 659 HC$3.00 MF$0.65

FOREIGN SCIENCE BULLETIN, VOL. 4, NO. 3, 1968.
Library of Congress Washington D C Aerospace Technology Div
For primary bibliographic entry see Field 20G.
AD-666 875 HC$3.00 MF$0.65

WEAPONS RADIATION SHIELDING HANDBOOK. CHAPTER 3. METHODS FOR CALCULATING NEUTRON AND GAMMA-RAY ATTENUATION,
Oak Ridge National Lab Tenn
Paul N. Stevens, and David K. Trubey. Mar 68, 118p
DASA-1892-3
See also Chapter 4, AD-816 092.

Descriptors: (*Nuclear radiation, Handbooks), (*Nuclear weapons, Shielding), Neutrons, Gamma rays, Mathematical models, Attenuation, Monte Carlo method, Special functions (Mathematical), Diffusion, Mathematical analysis, Radiation damage, Penetration, Programming (Computers), Transport properties, Nuclear cross sections.

Calculations of the attenuation of neutrons and gamma rays in shields can be performed by several techniques, the best technique for a particular problem depending on the type of problem to be solved and the degree of accuracy required. This chapter of the Handbook surveys the calculational methods used most frequently and provides summaries of digital computer codes based on the various methods. The methods covered are those of spherical harmonics, discrete ordinates, moments, Monte Carlo, diffusion theory, invariant imbedding, and kernels, plus a method which combines a removal kernel with diffusion theory. Except for the invariant imbedding method, all these techniques are either approximate solutions to the well-known Boltzmann equation or are based on kernels obtained from solutions to the equation. A discussion of the Boltzmann equation is also included in the chapter. (Author)
AD-666 973 HC$3.00 MF$0.65

THE RADIONUCLEIDE 101Ag.
California Univ Los Angeles
For primary bibliographic entry see Field 18B.
AD-667 108 Not available from CFSTI.

18I. Reactor Engineering and Operation

THE BALANCED OSCILLATOR TESTS IN SEFOR.
Kernforschungszentrum, Karlsruhe (West Germany). Inst. Fuer Angewandte Reaktorphysik.
M. Audoux, L. Caldarola, . Giordano, H. Rohrbacher, and C. Russell. Aug 67, 56p KFK-650, EUR-3686.E
Pre- Prepared in Cooperation With Euratom

Descriptors: *Fast nuclear reactors, *Oscillations, *Reactivity, Coolants, Feedback control, Nuclear reactor control, Transfer functions.

For abstract, see STAR 06 09.
N68-18857 HC$3.00 MF$0.65

REACTOR TEMPERATURE TRANSIENTS WITH SPATIAL VARIABLES. SECOND PART - AXIAL ANALYSIS.
Kernforschungszentrum, Karlsruhe (West Germany). Institut Fuer Angewandte Reaktorphysik.
L. Caldarola, W. Niedermeyer, and J. Woit. Jul 67, 136p KFK-618, EUR-2403.E
Spon- Sponsored By Euratom

Descriptors: *Coolants, *Heat balance, *Laplace oransformation, *Nuclear reactors, *Thermodynamics, Heat transfer, Nuclear fuel elements, Spatial dependencies, Specific heat, Thermal conductivity, Time dependence.

For abstract, see STAR 06 09.
N68-18966 HC$3.00 MF$0.65

INVESTIGATIONS OF CHARGES 3 AND 4 OF THE FAST-THERMAL ARGONAUT REACTOR.
Untersuchungen An Den Ladungen 3 Und 4 des Schnell-thermischen Argonaut-reaktors Stark
Kernforschungszentrum, Karlsruhe (West Germany). Institut Fuer Neutronenphysik Und Reaktortechnik.
L. Barleon, CHR. Bruecker, K. Burkart, G. Fieg, and D. Kuhn. Sep 67, 94p KFK-668, EUR-3701.D
Lang- in German Spon- Sponsored By Euratom

Descriptors: *Fast nuclear reactors, *Nuclear fuel elements, *Optimization, *Reactor technology, *Zero power reactors, Mathematical models, Operations research, Reactor cores, Reactor physics, Thermal neutrons, Uranium compounds.

For abstract, see STAR 06 09.
N68-19013 HC$3.00 MF$0.65

THE SAFETY OF STEAM-COOLED FAST REACTORS AS INFLUENCED BY THE DESIGN AND ARRANGEMENT OF THEIR COMPONENTS.
Kernforschungszentrum, Karlsruhe (West Germany). Inst. Fuer Reaktorbauelemente.
F. Erbacher, W. Frisch, W. Huebschmann, L. Ritz, and G. Woite. Oct 67, 53p KFK-655, EUR-3688.E
Prep- Prepared in Cooperation With Euratom

Descriptors: *Cooling systems, *Dynamic stability, *Fast nuclear reactors, *Reactor design, *Reactor safety, *Steam, Accident prevention, Components, Computerized simulation, Density (mass/volume), Feedback control, Floods, Leakage, Nuclear fuel elements, Performance prediction, Pipe flow, Pressure reduction, Reliability engineering, Rupturing.

For abstract, see STAR 06 09.
N68-1 252 HC$3.00 MF$0.65

18J. Reactor Materials

SOME CONSIDERATIONS ON THE INFRARED ABSORPTION SPECTRUM OF PU O2 POWDERS AND SINTERED PELLETS.
European Atomic Energy Community, Karlsruhe (West Germany). Joint Nuclear Research Center.
A. Barisich, K. Buijs, and L. Manes. 1968, 24p EUR-3739.E

Descriptors: *Spectrum analysis, Absorption, Infrared spectra, Nuclear fuels, Pellets, Plutonium oxides, Porous materials, Powder metallurgy, Sintering, Thorium oxides, Uranium oxides.

For abstract, see STAR 06 09.
N68-18498 HC$3.00 MF$0.65

SPECTRUM INDICES MEASUREMENTS IN ORGEL TYPE UC CLUSTER FUEL ELEMENTS.
European Atomic Energy Community, Ispra (Italy).
F. Conti. Jan 68, 40p EUR-3736.E

Descriptors: *Nuclear fuel elements, *Thermal energy, *Thermonuclear reactions, *Uranium carides, Clumps, Fuel systems, Indexes, Nuclear fuels, Spectrum analysis.

For abstract, see STAR 06 09.
N68-18534 HC$3.00 MF$0.65

RAPID SPECTROPHOTOMETRIC DETERMINATION OF PLUTONIUM.
Forsvarets Forskningsanstalt, Stockholm (Sweden).
For primary bibliographic entry see Field 7E.
For abstract, see STAR 06 09.
N68-18950 HC$3.00 MF$0.65

FORMATION OF COLLOIDAL SOLUTIONS OF PU4 AND THE CONVERSION INTO PU O2 MICROSPHERES.
European Atomic Energy Community, Karlsruhe (West Germany).
K. P. Louwrier, T. Steemers, and E. Zamorani. Jan 68, 20p EUR-3737.E

Descriptors: *Ceramic nuclear fuels, *Colloiding, *Plutonium oxides, Alcohols, Gelation, Metallography, Nitrates, Sintering, Solutes, Solvents, Spheres.

For abstract, see STAR 06 09.
N68-18964 HC$3.00 MF$0.65

REPROCESSING OF IRRADIATED FUELS QUARTERLY REPORT, 1 APR. - 30 JUN. 1967.
Centre D Etude de L Energie Nucleaire, Mol (Belgium).
30 Jun 67, 86p EURAEC-1934, EUR-3758
Contracts EURATOM-006-65-7-RCIB/RD/, EURATOM-016-65-1-RAP/B/

Descriptors: *Ceramic nuclear fuels, *Chlorine fluorides, *Production engineering, Irradiation, Plutonium, Vaporizing.

For abstract, see STAR 06 09.
N68-19035 HC$3.00 MF$0.65

HEATS OF FORMATION OF GASEOUS URANIUM FLUORIDES.
Commissariat A L Energie Atomique, Saclay (France).
For primary bibliographic entry see Field 7E.
For abstract, see STAR 06 09.
N68-19036 HC$3.00 MF$0.65

USE OF PLUTONIUM AS FUEL IN NUCLEAR REACTORS.
Laboratoires Du Centre D Etude de L Energie Nucleaire, Mol (Belgium). Societe Belge pour L Industrie Nucleaire, Brussels (Belgium).
Jul 67, 79p EURAEC-1929, EUR-3755
Prep- Prepared Jointly With Soc. Belg. pour Lind. Nucl.

Descriptors: *Nuclear fuels, *Plutonium, Ceramic nuclear fuels, Irradiation, Nuclear physics, Uranium oxides, Uranium 235.

For abstract, see STAR 06 09.
N68-19044 HC$3.00 MF$0.65

FAST BREEDER REACTORS WITH DIRECT BOILING COOLANTS.
Polish Academy of Sciences, Warsaw. Inst. of Nuclear Research.
For primary bibliographic entry see Field 18L.
For abstract, see STAR 06 09.
N68-19276 HC$3.00 MF$0.65

18K. Reactor Physics

A NUMERICAL APPROACH TO THE TIME-DEPENDENT DIFFUSION EQUATIONS.
European Atomic Energy Community, Ispra (Italy). Joint Nuclear Research Center.
A. Daneri, A. C. Daneri, and I. Galligani. 1968, 26p EUR-3742.E
Contract EURATOM-040-66-5 CETI

Descriptors: *Diffusion coefficient, *Iterative solution, *Neutron distribution, *Numerical analysis, *Particle diffusion, Approximation, Equations of motion, Problem solving, Theoretical physics, Time dependence.

For abstract, see STAR 06 09.
N68-18496 HC$3.00 MF$0.65

DETERMINATION OF INTERSECTION OF PARTICLE FLIGHT PATH WITH SURFACE OF HELICAL TUBULAR VOID REGION.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
C. D. Bogart, and M. L. Wohl. Mar 68, 25p
NASA-TN-D-4435
Contract 126-15-01-03-22

Descriptors: *Computer programs, *Ducts, *Fortran, *Particle flux density, *Transport properties, Flight paths, Flow geometry, Gamma rays, Helical flow, Monte carlo method, Neutron flux densi-

ty. Numerical analysis. Radiation shielding. Reactor physics. Wall flow.

For abstract, see STAR 06 09.
N68-18541 HC$3.00 MF$0.65

THE REACTOR NEUTRON CAPTURE CROSS SECTION OF SC46 AND A DETERMINATION OF THE BETA BRANCHING RATIO OF THE SC47 DECAY.
Oesterreichische Studiengesellschaft Fuer Atomenergie G.M.B.H., Seibersdorf.
Z.-T. Bak, and P. Riehs. 1967. 11p SGAE-PH-61/1967

Descriptors: *Absorption cross sections. *Neutron cross sections. *Radioactive decay. *Scandium isotopes. Beta particles. Gamma rays. Neutron activation analysis.

For abstract, see STAR 06 09.
N68-18856 HC$3.00 MF$0.65

SQUID-360 - A MULTIGROUP DIFFUSION PROGRAM WITH CRITICALITY SEARCHES FOR THE IBM-360.
Fiat S.P.A., Turin (Italy).
A. Daneri, B. Gabutti, and E. Salina. Feb 68. 130p EUR-3882.E
Contract EURATOM-089-66-2 TEEI

Descriptors: *Computer programs. *Diffusivity. *Fortran. *Ibm 360 computer. Differential equations. Mathematical models. Matrices (mathematics). Multiprogramming. Neutron scattering. Scattering cross sections. Time sharing.

For abstract, see STAR 06 09.
N68-18960 HC$3.00 MF$0.65

18L. Reactors (Power)

DESIGN OF PLUTONIUM SELF-SUSTAINING REACTOR. HEAVY WATER MODERATED BOILING LIGHT WATER COOLED.
Japan Atomic Energy Research Inst., Ibaraki.
S. Sawai, W. Shinoda, and S. Yasukawa. Jan 68. 15p JAERI-1151

Descriptors: *Boiling water reactors. *Reactor design. *Water moderated reactors. Heavy water. Nuclear power reactors. Nuclear reactor control. Plutonium. Reactor cores. Reactor safety. Reactor technology.

For abstract, see STAR 06 09.
N68-18879 HC$3.00 MF$0.65

FAST BREEDER REACTORS WITH DIRECT BOILING COOLANTS.
Predkie Reaktory Powielajace Bezposrednio Chlodzone Wrzacym Chlodziwem
Polish Academy of Sciences, Warsaw. Inst. of Nuclear Research.
M. Tayoe. 1967. 76p INR-842/C
Lang- in Russian. English Summary

Descriptors: *Coolants. *Fast neutrons. *Liquid metal cooled reactors. *Reactor physics. Boiling. Chlorides. Fast nuclear reactors. Heat exchangers. Nuclear fuels. Nuclear power reactors. Plutonium. Potassium. Safety factors. Sodium. Uranium.

For abstract, see STAR 06 09.
N68-19276 HC$3.00 MF$0.65

18N. SNAP Technology

SNAP-8 SIMULATOR LOOP MECHANICAL DESIGN.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
J. F. Reznik, A. S. Valerino, and J. C. Wood. Mar 68. 65p NASA-TM-X-1515
Contract 701-04-00-02-22
Coll- 65 P Refs

Descriptors: *Environment simulators. *Rankine cycle. *Snap 8. *Test facilities. Centrifugal pumps. Electromagnetic pumps. Heat radiators. Heating equipment. Liquid potassium. Liquid sodium. Loops. Mercury (metal).

For abstract, see STAR 06 09.
N68-18460 HC$3.00 MF$0.65

INSTRUMENTATION OF A SNAP-8 SIMULATOR FACILITY.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
J. N. Deyo, and W. T. Wintucky. Mar 68. 61p NASA-TM-X-1525
Contract 701-04-00-02-22

Descriptors: *Instruments. *Snap 8. *Test facilities. Calibrating. Data processing. Data systems. Flowmeters. Liquid metals. Pressure sensors. Rankine cycle. Thermocouples.

For abstract, see STAR 06 09.
N68-19001 HC$3.00 MF$0.65

PROJECTED LARGE SCALE USE OF RADIOISOTOPES BY NASA.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
For primary bibliographic entry see Field 18B.
For abstract, see STAR 06 09.
N68-19029 HC$3.00 MF$0.65

NUCLEAR THERMIONIC SPACE POWER SYSTEM CONCEPT EMPLOYING HEAT PIPES.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
C. A. Heath, and E. Lantz. Mar 68. 24p NASA-TN-D-4299
Contract 128-27-05-20-22

Descriptors: *Auxiliary power sources. *Pipe flow. *Space flight. *Temperature control. *Thermionic diodes. Cooling systems. Heat transmission. Nuclear electric power generation.

For abstract, see STAR 06 09.
N68-19146 HC$3.00 MF$0.65

19. ORDNANCE

19A. Ammunition, Explosives, and Pyrotechnics

EVALUATION OF LWL SMOKE TARGET MARKER.
Final rept., 20 Nov 64-31 Mar 65,
Joint Research and Test Activity, San Francisco, Calif. 96243.
William E. Crouch, Jr. Jun 65. 24p

Descriptors: (*Colored smokes. Effectiveness), (*Smoke munations. Grenades), Design. Performance (Engineering). Handling. Tests. Counterinsurgency. Markers. Targets. Jungles. Parachutes. Terrain. Vietnam.
Identifiers: South Vietnam.

The purpose for the evaluation was to determine if the LWL Smoke Target Marker would provide a satisfactory mark in jungles, in flooded rice paddies, in water and on dry land. The LWL Smoke Target consisted of three AN-M8 white smoke grenades mounted in two concentric cylinders with an airspace between the cylinders providing a flotation capability. The test item was utilized by US Army aviation units and by a VNAF reconnaissance squadron. It was used on normal combat operations under varying terrain, weather and operational conditions. Completed questionnaires were obtained from using units and additional data gathered by interview and discussion with using personnel. The LWL Smoke Target Marker produced an effective mark on varying types of terrain found in Vietnam. It was used primarily as a landing zone marker for airmobile operations, as its size and weight precluded use as a marker for random sources of ground fire encountered by aircraft during operations. A dispenser, mounted externally to the aircraft, was determined to be desirable and a design suggested to LWL. Based on comments of using unit, the U.S. Army Support Command -- Vietnam requested that the markers be precured for operational employment in Vietnam. Action on this request is pending. It was determined that the LWL Marker did provide a means of marking that heretofore has not been available to operational units. The combat effectiveness and efficiency of airmobile operations is improved by use of this type marker. (Author)
AD-467 837 HC$3.00 MF$0.65

REPORT OF THE NOVEMBER 1965 TEST FIRING SERIES PROJECT HARP,
Mcgill Univ Montreal (Quebec) Space Research Inst
For primary bibliographic entry see Field 4A.
AD-666 744 HC$3.00 MF$0.65

WIRE WOUND CARTRIDGE CASE.
Final rept.,
Westinghouse Electric Corp Pittsburgh Pa Research and Development Center
Ronald N. Sampson, Robert R. Dixon, and Walter V. Bratkowski. Jan 68. 25p
Contract DAAA21-68-C-0252

Descriptors: (*Cartridge cases, Wire), Ammunition, Plastics, Artillery, Binders, Guns, Steel, Tensile properties, Feasibility studies, Stresses, Performance (Engineering).
Identifiers: 152-MM ORDNANCE ITEMS, Reusable cartridge cases, *Wire-wound construction.

Results are presented of a 3 month concept study of a second generation cartridge case for 152 mm ammunition. The concept described herein consists of a wire wound cartridge case bonded together with a resinous binder. The wire may be a metal or non-metal. One end of the wire is fastened to the projectile and as the projectile is fired the wire unspools and is carried from the gun.
AD-666 789 HC$3.00 MF$0.65

AN ANALYSIS OF THE M48 TROOP TEST FIRING DATA,
George Washington Univ Alexandria Va Human Resources Research Office
For primary bibliographic entry see Field 19C.
AD-666 808 HC$3.00 MF$0.65

ELECTRONIC STRUCTURE AND STABILITY OF THE INORGANIC FULMINATES,
Cambridge Univ (England) Cavendish Lab
For primary bibliographic entry see Field 7B.
AD-667 129 Not available from CFSTI.

19C. Combat Vehicles

AN ANALYSIS OF THE M48 TROOP TEST FIRING DATA,
George Washington Univ Alexandria Va Human Resources Research Office
Charles A. Bancroft. Mar 55, 19p
Research supported by the Department of the Army.

Descriptors: (*Tanks (Combat vehicles), *Firing tests (Ordnance)), (*Army personnel, Performance (Human)), Self-propelled guns, Accuracy, Correlation techniques, Antipersonnel ammunition, High-explosive ammunition, Ranges (Distance), Antiarmor ammunition, Scattering, Statistical analysis, Surface targets, Gun barrels, Life expectancy.
Identifiers: M-48 tanks.

This report is an analysis of the data from four of the tank gun firing tests conducted during the M48 Troop Test. In two of these tests (Test II and Test II Modified) one round was fired at each of five targets at unknown ranges. In the other two tests (the first and the second firings of Test 12) five rounds were fired at each of six targets at known ranges. Seventeen tanks were used for the tests, the same crews manning them throughout. A correlation between hit scores for the first two tests yielded a coefficient which is statistically non-significant. For the second two tests, correlations between scores made at different target ranges and correlations between scores made with different types of ammunition also yielded coefficients which are non-significant. Dispersions of the five-round shot groups served as scores. (Vertical dispersion and horizontal dispersion were treated separately because the two measures were found to be unrelated). (Author)
AD-666 808 HC$3.00 MF$0.65

19D. Explosions, Ballistics, and Armor

A SURVEY OF POTENTIAL CERAMIC ARMOR MATERIALS.
Army Materials and Mechanics Research Center Watertown Mass
For primary bibliographic entry see Field 11B.
AD-666 766 HC$3.00 MF$0.65

AN ESTIMATION OF THE PERSONNEL HAZARDS FROM A MULTI-TON BLAST IN A CONIFEROUS FOREST.
Lovelace Foundation for Medical Education and Research Albuquerque N Mex
For primary bibliographic entry see Field 18C.
AD-666 822 HC$3.00 MF$0.65

PRESSURE MEASUREMENTS IN BASALT FINAL REPORT, 13 JUN. 1966 - 13 FEB. 1967.
Physics International Co., San Leandro, Calif.
For primary bibliographic entry see Field 20K.
For abstract, see STAR 06 09.
N68-18495 HC$3.00 MF$0.65

19F. Guns

BARREL EROSION STUDY OF RIFLES, 5.56MM, M16 AND XM16E1 - A JOINT ARMY-AIR FORCE TEST.
Technical rept.,
Springfield Armory, Mass.
P. R. Landry, and C. E. Nilsson. Jan 66, 236p
TR11-5000

Descriptors: (*Gun barrels, *Erosion), (*Rifles, Gun barrels), Design, Firing, Tests (ordnance), Meters, Failure (mechanics), Graphics, Velocity, Cleaning, Test methods, Gases, Metals, Fatigue (mechanics), Springs, Bolts, Experimental data.
Identifiers: M-16 Rifles (5.56mm).

Twelve rifles, 5.56mm, XM161E1 were fired to the end of their barrel bore service life. Measurements of the barrel bore were taken periodically with an air gage, and an expanding mandrel gage. It was determined that the maximum acceptable barrel bore diameter would be 0.2206 in. The barrel bore was considered serviceable for either overseas or conus use if that diameter had not advanced forward of the origin of the rifling further than 3.625 inches. Advancement to 6.625 in. was considered the cut-off for conus use only, and advancement beyond 6.625 would constitute complete rejection of the barrel. Gage, barrel erosion C7799792, designed by Springfield Armory, is recommended for this purpose. Test procedures are described and results discussed.
AD-483 309 HC$3.00 MF$0.65

REPORT OF THE NOVEMBER 1965 TEST FIRING SERIES PROJECT HARP,
Mcgill Univ Montreal (Quebec) Space Research Inst
For primary bibliographic entry see Field 4A.
AD-666 744 HC$3.00 MF$0.65

AEROSPACE APPLICATION OF GUN LAUNCHED PROJECTILES AND ROCKETS,
Mcgill Univ Montreal (Quebec) Space Research Inst
For primary bibliographic entry see Field 4A.
AD-666 746 HC$3.00 MF$0.65

19G. Rockets

ROCKET AND SATELLITE TECHNIQUES FOR MEASUREMENT OF ELECTRON DENSITY AND RELATED IONOSPHERIC PARAMETERS.
Utah Univ Salt Lake City Upper Air Research Labs
For primary bibliographic entry see Field 4A.
AD-666 671 HC$3.00 MF$0.65

20. PHYSICS

20A. Acoustics

TWO-PHASE GAS-LIQUID FLOW DYNAMICS: PART I. FLOW OSCILLATIONS IN TRANSPARENT, PARALLEL, VERTICAL, HEATED CHANNELS. PART II. ACOUSTIC VELOCITY IN TWO-PHASE FLOW.
Massachusetts Inst of Tech Cambridge Engineering Projects Lab
For primary bibliographic entry see Field 20D.
AD-666 618 HC$3.00 MF$0.65

EFFECTS OF RADIATED AERODYNAMIC NOISE ON MODEL BOUNDARY-LAYER TRANSITION IN SUPERSONIC AND HYPERSONIC WIND TUNNELS.
Arnold Engineering Development Center Arnold Air Force Station Tenn
For primary bibliographic entry see Field 22B.
AD-666 644 HC$3.00 MF$0.65

PHOTOELASTIC DETECTION OF ULTRASONIC PULSES.
Army Materials Research Agency Watertown Mass
For primary bibliographic entry see Field 20K.
AD-666 805 HC$3.00 MF$0.65

THE INCOMPRESSIBLE ЄOANDA FLOW AROUND CIRCULAR CYLINDER AFFECTED BY SOUND ENERGY.
Catholic Univ of America Washington D C Dept of Mechanical Engineering
For primary bibliographic entry see Field 20D.
AD-666 806 HC$3.00 MF$0.65

SENSITIVITY OF VARIOUS DETECTORS TO KNOWLEDGE OF SIGNAL AND NOISE PARAMETERS.
Technical rept.,
Bell Telephone Labs Inc Whippany N J
H. M. Hall, Jr. 9 Jan 67, 33p Rept no. TR-11
Contract N00014-66-C-0005
Prepared in cooperation with Western Electric Co., Inc., New York.

Descriptors: (*Underwater sound signals, Detectors), (*Sound transmission, Detection), Signal-to-noise ratio, Statistical processes, Filters (Electromagnetic wave), Probability, Integral equations, Linear systems, Nonlinear systems.

This work is concerned with the problem of detecting a random signal in the presence of additive noise when the distributions of both signal and noise are known except for the values of some particular parameters. The approach used is based upon the use of signal 'shape' information; i.e., knowledge of the degree to which both the observed signal and noise energy tend to be concentrated, in order to determine decision rules that are useful, independent of the values actually assumed by the unknown parameters. To proceed quantitatively with this approach, a particular hypothesis testing problem is formulated in which N independent observations are made. Each observable is taken to be chi-square distributed with two degrees of freedom, but with a mean value that may be unknown both when the signal is present and when it is absent. (Author)
AD-666 833 HC$3.00 MF$0.65

FINITE DIFFERENCE SOLUTIONS OF THE ACOUSTIC RADIATION EQUATION IN THE NEAR FIELD.
Technical rept.,
Houston Univ Tex Dept of Mechanical Engineering
Yeh-Pei Lu, and S. Bart Childs. Sep 67, 55p Rept no. TR-7
Contract Nonr-4492 (01)
See also Technical Report no. 4, AD-636 630.

Descriptors: (*Sound transmission, Numerical methods and procedures), Potential theory, Boundary value problems, Difference equations, Iterative methods, Matrix algebra.
Identifiers: Near field, Helmholtz equation.

Numerical methods for the solution of the finite difference approximation to the acoustic radiation equation are discussed. For a spherical radiator, the Gauss-Seidel iterative method and the alternating direction implicit method are employed to solve the discrete approximation of the Helmholtz equation in the near field. Emphasis is on the development of the general numerical method and on the extrapolation scheme used to increase the rate of convergence. Measures of the number of calculations needed for various methods of solution are reported. A discussion of the nature of the acoustic radiation problem in numerical computation is also presented. (Author)
AD-666 960 HC$3.00 MF$0.65

QUANTUM OSCILLATIONS OF THE VELOCITY OF SOUND IN GALLIUM.
Massachusetts Inst of Tech Cambridge National Magnet Lab
For primary bibliographic entry see Field 20L.
AD-667 160 Not available from CFSTI.

QUARTERLY BULLETIN OF THE DIVISION OF MECHANICAL ENGINEERING AND THE NATIONAL AERONAUTICAL ESTABLISHMENT.
National Research Council of Canada Ottawa (Ontario) Div of Mechanical Engineering
For primary bibliographic entry see Field 5B.
AD-667 180 HC$3.00 MF$0.65

NOISE - EFFECTS ON MAN AND MATERIALS. A SELECTED BIBLIOGRAPHY.

Group 20A—Acoustics

National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
15 Feb 68, 32p NASA-TM-X-60904, GP-464

Descriptors: *Bibliographies, *Human tolerances, *Noise tolerance, Abstracts, Acoustics, Audiometry, Auditory stimuli, Documentation, Human factors laboratories, Information retrieval, Literature, Noise intensity, Noise reduction, Noise spectra.

For abstract, see STAR 06 09.
N68-18952 HC$3.00 MF$0.65

20B. Crystallography

TIME-DEPENDENCE OF CRYSTAL ORIENTATION IN CRYSTALLINE POLYMERS.
Massachusetts Univ Amherst Polymer Research Inst
For primary bibliographic entry see Field 7D.
AD-666 622 HC$3.00 MF$0.65

IMPROVED INTERNAL FRICTION APPARATUS,
Northwestern Univ Evanston Ill Dept of Materials Science
For primary bibliographic entry see Field 14B.
AD-666 733 Not available from CFSTI.

VACANCY ANNEALING IN THREE DIFFERENT EXPERIMENTS IN GOLD.
Revised ed.,
Illinois Univ Urbana Materials Research Lab
R. K. Sharma, C. Lee, and J. S. Koehler. 30 Oct 67, 6p
AROD-3369:4
Contracts DA-31-124-ARO (D)-65, AT (11-1)1198
Revision of report dated 14 Aug 67.
Availability: Published in Physical Review Letters, v19 n24 p1379-81 11 Dec 67.

Descriptors: (*Crystal lattice defects, Transport properties), Gold, Annealing, Cryogenics, Electron bombardment, Quenching (Cooling), Deformation, Tensile properties.

If the concept of lattice vacancies is to be useful, then one should be able to identify lattice-vacancy migration in different experiments in which other defects have also been introduced. To date, such a demonstration has not been given for any metal. The present note reports briefly the results of experiments in which vacancies were introduced into very pure gold by quenching, by 3-MeV electron irradiation at 100K, and by a few percent tensile deformation at 4.2K. One observes in all cases a prominent annealing process which occurs in the range from 20 to 80C (for the concentrations used here) with an activation energy in the purest specimens of 0.90 plus or minus 0.06 eV. (Author)
AD-666 872 Not available from CFSTI.

INVESTIGATION OF CRYSTAL IMPERFECTIONS BY MEANS OF LASER LIGHT SCATTERING.
Physical sciences research papers no. 351,
Air Force Cambridge Research Labs L G Hanscom Field Mass
Richard C. Powell. Dec 67, 66p Rept no. AFCRL-67-0648

Descriptors: (*Non-destructive testing, Crystal lattice defects), (*Crystal lattice defects, Light transmission), Ruby, Coherent radiation, Lasers, Scattering, Crystal growth, Annealing, Polarization, Nuclear radiation, Interactions, Dislocations.
Identifiers: *Laser ultramicroscopy.

The use of light scattering as a method for studying imperfections in crystals is discussed. A unique apparatus using a laser as a light source for ultramicroscopy and angular scattering experiments is described. The results obtained utilizing this apparatus for investigations of imperfections in ruby crystals are presented and discussed. These investigations were done as a function of crystal growth direction, annealing, boule morphology, polarization, chromium concentration, gamma-irradiation, and temperature. The results of this work demonstrate the usefulness of this new equipment as a convenient, nondestructive technique for characterizing imperfections in crystals of relatively large size. They also indicate the existence of both randomly distributed scatterers and oriented scattering regions in ruby crystals and show how these scattering centers are altered by changes in the various parameters studied in this investigation. (Author)
AD-666 918 HC$3.00 MF$0.65

DIELECTRIC AND OPTICAL PROPERTIES OF CRYSTALLINE ARGON.
Frankford Arsenal Philadelphia Pa Pitman-Dunn Research Labs
For primary bibliographic entry see Field 7D.
AD-666 982 Not available from CFSTI.

TETRAGONAL CRYSTAL-FIELD ENERGY LEVELS--CaF2:Sm3+ AND CdF2:Sm3+.
Revised ed.,
Army Electronics Command Fort Monmouth N J Inst for Exploratory Research
Norman Rabbiner. 16 Jun 67, 5p
Doctoral thesis.
Availability: Published in Journal of the Optical Society of America, v57 n11 p1376-80 Nov 1967.

Descriptors: (*Crystal lattices, Field theory), Molecular energy levels, Symmetry (Crystallography), Band theory of solids, Perturbation theory, Calcium fluorides, Cadmium compounds, Fluorides, Samarium, Hamiltonian, Fluorescence, Line spectrum, Theses.

Theoretical energy-level schemes are derived to first order of perturbation theory and compared with those empirically derived for both a crystal of CaF2:Sm3+ and one of CdF2:Sm3+ in a crystal field of tetragonal symmetry. The resulting deviation of the energies between the theoretical and empirical schemes is within 40 reciprocal cm for ten of the twelve crystal-field energy levels of the ground 6H multiplet states terminating the observed fluorescence lines. The theoretical schemes are derived for a unique set of values for the five crystal-field parameters of the tetragonal field. This is substantial additional support for an assignment of tetragonal symmetry for both of these crystals. Tables are given of the resulting approximate values of the crystal-field parameters, level energies, and level eigenfunctions. (Author)
AD-667 105 Not available from CFSTI.

SIXTEEN NEW MIXED-LAYER HEXAGONAL FERRITES,
Army Electronics Command Fort Monmouth N J Inst for Exploratory Research
D. W. Eckart, and J. A. Kohn. 1967, 5p
Availability: Published in Zeitschrift fur Kristallographie, v125 n1-6 p130-3 1967.

Descriptors: (*Ferrites, Crystal structure), Barium compounds, Zinc compounds, Cobalt compounds, Manganese compounds, Copper compounds, X-ray diffraction analysis, Single crystals.

Single-crystal x-ray diffraction studies have revealed 16 additional hexagonal ferrite stacking structures of the type BaMe (2+)FeO in flux-grown material with Me nominally Zn, Co, Mn + Zn, or Cu + Zn. Structures are well ordered and fall into the two general series previously established, MnS and MpYn. Stacking sequences and space groups are given; c dimensions range from 110.4 to 854.0A. (Author)
AD-667 109 Not available from CFSTI.

MINERAL WEAR IN RELATION TO PAVEMENT SLIPPERINESS,
Pennsylvania State Univ., University Park. Dept. of Mechanical Engineering.
For primary bibliographic entry see Field 13B.
PB-177 754 HC$3.00 MF$0.65

20C. Electricity and Magnetism

INVESTIGATION OF ORDERED MAGNETIC STATES AND THEIR CORRELATIONS TO OPTICAL AND ELECTRICAL PROPERTIES OF SELECTED MATERIALS.
Mithras Inc Cambridge Mass
For primary bibliographic entry see Field 20L.
AD-666 676 HC$3.00 MF$0.65

MECHANISMS OF ENERGY TRANSFER IN DIELECTRICS.
Semiannual rept. no. 3, 1 Apr-30 Sep 67,
New York Univ N Y Radiation and Solid State Lab
Werner Brandt. Feb 68, 14p
ECOM-01999-3
Contract DA-28-043-AMC-01999 (E)
See also rept. no. 2, AD-662 714.

Descriptors: (*Dielectrics, Annihilation radiation), (*Annihilation radiation, Positrons), Radiation damage, Nuclear cross sections, Electrons, Excitation, Ionization, Interactions, Transients, Electric insulation, Elastic scattering, Band theory of solids, Polyethylene plastics.
Identifiers: Energy transfer.

The processes pertinent to the moderation of electrons of energies near the internal ionization energy of a dielectric are studied. The probe for these studies is the positron through its annihilation characteristics. The decay characteristics are related to the cross sections of electronic scattering and energy loss. (Author)
AD-666 775 HC$3.00 MF$0.65

THE PHOTOELECTRIC EFFECT WITHOUT PHOTONS,
Miami Univ Coral Gables Fla Center for Theoretical Studies
Willis E. Lamb, Jr., and Marlan O. Scully. Feb 68, 15p Rept no. CTS-QED-68-1
Prepared in cooperation with MIT, under contract SD-90.

Descriptors: (*Photoelectric effect, Quantum mechanics), Education, Electromagnetic waves, Photons, Atomic energy levels, Excitation, Ionization, Perturbation theory.

A misconception which most physicists acquire in their formative years is that the photoelectric effect requires the quantization of the electromagnetic field for its explanation. This report shows that the photoelectric effect may be completely explained without invoking the concept of 'light quanta.'
AD-666 821 HC$3.00 MF$0.65

S-MATRIX THEORY OF LOCAL MOMENTS,
California Univ San Diego La Jolla
For primary bibliographic entry see Field 20J.
AD-666 844 Not available from CFSTI.

ULTRASONIC ATTENUATION NEAR THE NEEL TEMPERATURE OF CHROMIUM,
Catholic Univ of America Washington D C
E. J. O'Brien, and J. Franklin. Jun 66, 7p
AROD-5216:1
Grant DA-ARO (D)-31-124-G635
Availability: Published in Journal of Applied Physics, v37 n7 p2809-12 Jun 1966.

Descriptors: (*Antiferromagnetism, Chromium), Single crystals, Attenuation, Ultrasonic radiation, Transition temperature, Relaxation time.
Identifiers: Neel temperature, Ultrasonic attenuation, Pulse echo technique.

It has been known for several years that single crystals of chromium display a narrow peak in the

ultrasonic attenuation at temperatures near the Neel temperature. There are presented detailed measurements of the attenuation of longitudinal waves which were made to ascertain whether the peak could be explained by a temperature-dependent relaxation time. The attenuation was found to increase linearly with frequency for temperatures above the peak, and was not a simple function of frequency at lower temperatures. In either case, a simple relaxation mechanism appears not to operate, and a theory developed specifically for chromium seems necessary. The temperature dependence of the attenuation above the peak temperature follows a Gaussian falloff and is probably attributable to inhomogenieties, which smear out the local Neel temperatures. (Author)
AD-666 870 Not available from CFSTI.

CONCERNING THE UNIQUENESS OF A MOLECULAR FIELD SOLUTION FOR TWO MAGNETIC SUBLATTICES,
Clarkson Coll of Technology Potsdam N Y
E. E. Anderson. 1 Mar 68, 7p
AFOSR-68-0593
Grant AF-AFOSR-1156-66
Availability: Published in Physica Status Solida, v25 pK3k-4 1968.

Descriptors: (*Field theory, Magnetism), Transition temperature, Crystal lattices, Problem solving, Garnet, Yttrium compounds, Iron compounds.
Identifiers: Ferromagnetism, Molecular field theory.

It is shown that a unique solution of the molecular field equations for a two sublattice system can be obtained provided one has experimental information on the total magnetization vs temperature and the temperature dependence of the sublattice magnetizations near the Neel point. (Author)
AD-666 999 Not available from CFSTI.

TRANSIENTS AND NON-OHMIC BEHAVIOR IN CERIUM OXIDE,
Arizona State Univ Tempe Dept of Physics
Clement J. Kevane, and E. L. Holverson. 19 Mar 68, 2p
AFOSR-68-0609
Grant AF-AFOSR-609-65
Availability: Published in Journal of Applied Physics, v38 n13 p5421 Dec 1967.

Descriptors: (*Cerium compounds, *Ionic current), Oxides, Transients, Resistance (Electrical), Electric currents, Voltage.
Identifiers: Ceric oxide.

A recent paper raised certain points of disagreement with previously reported results concerning ionic conduction and transient conduction effects in cerium oxide. A few comments should be made and previously unpublished current-voltage relations shown by way of clarification. (Author)
AD-667 008 Not available from CFSTI.

ON THE 'PHYSICAL REALITY OF ELECTROMAGNETIC POTENTIALS,'
Brandeis Univ Waltham Mass Dept of Physics
Robert Golub, John P. Carrico, Talbert S. Stein, and Martin C. Weisskopf. Jan 68, 7p Rept no. Scientific-8
AFCRL-68-0064
Contract AF 19 (628)-5833
Availability: Published in Physics Letters, v25A n7 p495-6 Oct 9 1967.

Descriptors: (*Magnetic moments, Interactions), (*Electrostatics, Voltage), Frequency shift, Resonant frequency, Curve fitting, Magnetic fields, Molecular beams, Potassium, Torque.
Identifiers: Electromagnetic potentials, Electrostatic potentials.

Based on a recent proposal of de Beauregard one expects a shift, proportional to electrostatic potential, in the resonant frequency of an atom in a magnetic field. Data are presented which fail to show this shift. (Author)
AD-667 015 Not available from CFSTI.

SPECIFIC HEAT OF AU4V,
California Univ San Diego La Jolla Dept of Physics
H. L. Luo, L. Creveling, and J. P. Maita. 20 Feb 68, 4p
AFOSR-68-0562
Grant AF-AFOSR-631-67
Prepared in cooperation with Bell Telephone Labs., Murray Hill, N. J.
Availability: Published in Physics Letters, v24A n10 p740-1 Nov 20 1967.

Descriptors: (*Gold compounds, *Specific heat), Cryogenics, Anisotropy, Anomalies, Phase studies, Magnetic properties.
Identifiers: Debye temperature, Spin waves.

The specific heat of Au4V has been measured from 1.5 to 60 degrees K. An anomaly was observed near 50 degrees K. The electronic specific heat and the Debye temperature were calculated, and the magnetic entropy was crudely estimated. (Author)
AD-667 018 Not available from CFSTI.

MOTION OF THE VORTEX STRUCTURE IN TYPE-II SUPERCONDUCTORS IN HIGH MAGNETIC FIELD,
California Univ San Diego La Jolla Dept of Physics
Christiane Caroli, and Kazumi Maki. 20 Feb 68, 18p
AFOSR-68-0540
Grant AF-AFOSR-610-67
Availability: Published in Physical Review, v164 n2 p591-607 10 Dec 1967.

Descriptors: (*Superconductors, Transport properties), Resistance (Electrical), Electric fields, Magnetic fields, Vortices, Polarization, Heat transfer, Seebeck effect, Peltier effect.
Identifiers: Order parameters, Ettingshausen effect.

The report describes microscopically the resistive state in Type-II superconductors in high field in two extreme limits (i.e., the dirty limit and the pure limit). It is established that in high magnetic field, a constant electric field induces (1) a uniform motion of the order parameter in the direction perpendicular to both the electric and the magnetic fields with velocity -u = -E/H sub c2, and (2) a polarization along the electric field proportional to this velocity. This gives rise to additional contributions to the electric and thermoelectric transport coefficients. The changes of longitudinal resistivity and Ettinghausen coefficient due to the above effect are calculated. The variations of the Hall angle and the Peltier coefficient are obtained in the pure limit.
AD-667 041 Not available from CFSTI.

SYMMETRY OF GROUND STATE IN A DILUTE MAGNETIC METAL ALLOY.
Interim rept.,
Yale Univ New Haven Conn Dept of Physics
D. C. Mattis. 15 Mar 68, 5p
AFOSR-68-0584
Grant AF-AFOSR-1075-66
Availability: Published in Physical Review Letters, v19 n26 p1478-81 25 Dec 67.

Descriptors: (*Magnetic moments, Interactions), (*Band theory of solids, Magnetism), Hamiltonian, Perturbation theory, Antiferromagnetism, Ferromagnetism, Impurities, Alloys, Solid state physics.
Identifiers: Symmetry (Quantum mechanics), Quantum number.

It is proved that the spin of the ground state of a magnetic atom having exchange interaction with a nonmagnetic host metal is s = minus or plus 1/2, where s = spin of noninteracting magnetic atom, the upper sign is appropriate to antiferromagnetic coupling, and the lower, to ferromagnetic coupling. This result is generalized to any number of conduction bands and to nonpointlike impurities, provided that the exchange interactions with the number of conduction bands, or with the various partial waves, are all of the same sign. For p such bands or partial waves, the result is that the ground-state spin = the absolute value of (s = minus or plus 1/2 p). (Author)
AD-667 047 Not available from CFSTI.

s-d EXCHANGE DAMPING OF FERROMAGNETIC RESONANCE.
Doctoral thesis,
Michigan State Univ East Lansing Dept of Physics and Astronomy
Leroy Colquitt, Jr. 10 Dec 67, 11p
AFOSR-68-0560
Grants AF-AFOSR-196-66, NSF-GR-5048
Revision of report dated 28 Jul 66.
Availability: Published in The Physical Review, v164 n2 p688-96 10 Dec 67.

Descriptors: (*Magnetic resonance, Damping), (*Magnetic moments, Interactions), Equations of motion, Band theory of solids, Electrons, Radio waves, Crystal lattices, Perturbation theory, Theses.
Identifiers: Ferromagnetic resonance, Spin waves, Skin effect, Maxwell's equations.

The s-d exchange interaction between conduction electrons and magnetic ions is exploited as a damping mechanism for ferromagnetic resonance. One of the unique features of resonance in the ferromagnetic metals, as opposed to insulators, is that the rf fields penetrate the metal only within the skin depth. We focus on the effect of the rf electric field on the magnetic system through the conduction electrons. The central idea pursued is that the existence of a skin depth in a metal is evidence of a modified distribution function of the conduction electrons. This shift in the distribution function then perturbs the magnetic system through the s-d interaction. It is argued in this paper that the effect of this perturbation is to give rise to an important damping mechanism for ferromagnetic resonance. (Author)
AD-667 048 Not available from CFSTI.

MAGNETIC MOMENT OF Pd TO 150kG: LIMITS OF EXCHANGE ENHANCEMENT IN Pd.
Scientific interim rept.,
Massachusetts Inst of Tech Cambridge National Magnet Lab
S. Foner, and E. J. McNiff, Jr. 28 Feb 68, 5p
Rept no. JP-281
AFOSR-68-0559
Contract F44620-67-C-0047
Availability: Published in Physical Review Letters, v19 n25 p1438-41 Dec 1967.

Descriptors: (*Palladium, *Magnetic moments), Cryogenics, Magnetic properties, Anomalies, Interactions, Band theory of solids, Ferromagnetism, Phase studies.
Identifiers: Magnetic susceptibility.

Magnetic moment data are presented for high-purity Pd at 4.2 degrees K. The magnetic moment is a linear function of B up to 150 kG. On the basis of Wohlfarth's recent analysis of the high-field enhanced Pauli paramagnetism of Pd, the experiments determine limits of exchange enhancement for Pd and increase the minimum field for field-induced ferromagnetism in Pd. (Author)
AD-667 060 Not available from CFSTI.

SPIN POLARIZATION AROUND A LOCALIZED MAGNETIC IMPURITY IN A MAGNETIZED METAL.
Scientific Interim rept.,
Massachusetts Inst of Tech Cambridge National Magnet Lab
D. J. Kim, and Brian B. Schwartz. 13 Mar 68, 5p
Rept no. JP-289
AFOSR-68-0589
Contract F44620-67-C-0047
Availability: Published in Physical Review Letters, v20 n5 p201-4 Jan 1968.

Descriptors: (*Magnetic moments, Interactions), (*Band theory of solids, Impurities), Polarization,

Ferromagnetism, Neutron diffraction analysis, Palladium alloys, Nickel alloys, Iron alloys.

Recently, neutron diffraction experiments have been used to obtain the spatial distribution of the magnetic disturbance about solute atoms in Pd, Ni, and Fe. These measurements show that the disturbance produced around a magnetic impurity is quite different for different host metals. For low-concentration Pd;Fe alloys, the range of the conduction-electron polarization about the Fe impurity is long-on the order of 10 A. In contrast to this long-range behavior, the disturbance due to a magnetic impurity in ferromagnetic Ni is almost confined to the impurity site. A magnetic impurity in ferromagnetic Fe produces a disturbance intermediate in range between Pd-Fe and Ni. In this Letter we present calculations which correlate the behavior of the disturbance associated with a localized moment with the band splitting of the host-metal electrons including exchange effects fully.
AD-667 061 Not available from CFSTI.

CHARGING AND THE MAGNETIC SUSCEPTIBILITY OF SILVER-GOLD AND ALPHA-PHASE COPPER-GOLD ALLOYS,
National Research Council of Canada Ottawa (Ontario) Div of Applied Chemistry
C. M. Hurd. 15 Jan 68, 6p
NRC-9908
Availability: Published in The Physical Review, v165 n3 p816-20 15 January 1968.

Descriptors: (*Alloys, *Magnetic properties), Gold alloys, Silver alloys, Copper alloys, Low-temperature research, Cryogenics, Band theory of solids, Specific heat.
Identifiers: Electronic specific heat, Magnetic susceptability, Electron gas.

The report presents data for the total mass magnetic susceptibility of Ag-Au alloys in the approximate range 6-300 degrees K, and for alpha-phase Cu-Au alloys at 292 degrees K. By making certain simplifying approximations we have estimated from these data the values of the Pauli paramagnetic spin susceptibility chi superscript P for the pure metals and for the alloys. A deduction from Stern's theory for such an alloy system was tested. The deviation of chi superscript P from the corresponding value obtained by linear interpolation between the values for the pure constituents should vary parabolically with solute concentration. This parabolic dependence is qualitatively confirmed for both the Ag-Au and the Cu-Au systems.
AD-667 070 Not available from CFSTI.

IMPROVED TWO-PORT MAGNETOELASTIC DELAY LINE EFFICIENCY THROUGH CONTROLLED POLARIZATION REVERSALS,
Army Electronics Command Fort Monmouth N J Electronic Components Lab
For primary bibliographic entry see Field 9A.
AD-667 116 Not available from CFSTI.

INTERACTION OF A TRAVELING MAGNETIC FIELD WITH RIGID CONDUCTING SPHERES OR CYLINDERS.
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
Richard J. Thome. 25 Sep 67, 7p
Revision of report dated 23 Mar 67.
Availability: Published in Proceedings of the IEEE, v55 n12 p2116-22 1967.

Descriptors: (*Magnetohydrodynamic generators, Interactions), (*Magnetic fields, Interactions), Electromechanical converters, Spheres, Cylindrical bodies, Magnetohydrodynamics, Reynolds number, Heat transfer, Liquid metals.
Identifiers: Maxwell's equations.

The case of a rigid conducting sphere or cylinder that travels with uniform velocity relative to a two-dimensional, primarily transverse magnetic field with sinusoidal variation in space and time is analyzed to determine the electromechanical characteristics of the interaction. Interest is centered on conductors with diameters small relative to the wavelength of the applied field. The study is concluded with a determination of the condition under which two spheres or cylinders are electromagnetically independent so that the results for a distribution of conductors may be obtained by superposition of the results for a single body. Situations which may be modeled using the results of this study include holdup or separation of a highly conducting liquid phase from a two-phase flow in heat transfer apparatus as a result of the application of a magnetic field gradient or the energy conversion in a liquid metal magnetohydrodynamic induction machine with a two-phase working fluid. (Author)
AD-667 122 Not available from CFSTI.

POLARIZATION PROPERTIES OF A SIMPLE DIELECTRIC ROUGH-SURFACE MODEL,
Grumman Aircraft Engineering Corp Bethpage N Y Research Dept
For primary bibliographic entry see Field 20F.
AD-667 158 Not available from CFSTI.

INVESTIGATIONS OF BROADBAND FERROMAGNETIC POWER LIMITERS AND EXPANDERS AS DUPLEXING ELEMENTS FOR MICROWAVE SYSTEMS.
Microwave Electronics, Palo Alto, Calif.
For primary bibliographic entry see Field 9E.
AD-809 080 HC$3.00 MF$0.65

20D. Fluid Mechanics

NUMERICAL STUDY OF THE NAVIER STOKES EQUATIONS IN THREE DIMENSIONS.
Technical summary rept.,
Wisconsin Univ Madison Mathematics Research Center
Padam Jain. Mar 67, 88p Rept no. MRC-TSR-751
Contract DA-31-124-ARO (D)-462

Descriptors: (*Navier-Stokes equations, Numerical analysis), (*Turbulence, Boundary value problems), Fluid flow, Reynolds number, Initial value problems, Statistical functions, Periodic variations, Operators (Mathematics).
Identifiers: Energy transfer.

To investigate the process of energy transfer from large eddies to smaller ones at high Reynolds Numbers, a finite difference method is used to obtain the periodic solutions of the Navier-Stokes equations in three dimensions when the initial motion is assumed to be v sub 1 = cos x sin y sin z, v sub 2 = -sin x cos y sin z, v sub 3 = 0. A numerical technique for the solution of Poisson's equation for the three dimensional problem is described and used for the solution of the problem. Mean kinetic energy and mean square vorticity are calculated and it is found that the numerical method provides estimates of these quantities up to a time of the order of 2. The structure of the turbulent flow is investigated by a study of the velocity correlation function R sub ij. (Author)
AD-666 604 HC$3.00 MF$0.65

ON HEAD SEAS TRAVELLING ALONG A HORIZONTAL CYLINDER.
Technical summary rept.,
Wisconsin Univ Madison Mathematics Research Center
F. Ursell. Aug 67, 31p Rept no. MRC-TSR-811
Contract DA-31-124-ARO (D)-462

Descriptors: (*Ships, *Hydrodynamics), Wave transmission, Periodic variations, Interactions, Response, Potential theory, Boundary value problems, Wave functions, Integral equations, Saddle point method.

It is shown that, on the usual assumptions of linearized theory, head seas cannot travel along a horizontal cylinder without change of form. (Author)
AD-666 612 HC$3.00 MF$0.65

TWO-PHASE GAS-LIQUID FLOW DYNAMICS: PART I. FLOW OSCILLATIONS IN TRANSPARENT, PARALLEL, VERTICAL, HEATED CHANNELS. PART II. ACOUSTIC VELOCITY IN TWO-PHASE FLOW.
Tropical rept. 1 Feb 65-30 Nov 67,
Massachusetts Inst of Tech Cambridge Engineering Projects Lab
S. William Gouse, Jr., Rowland G. Evans, Charles W. Deane, and John C. Crowley. Nov 67, 121p
Contract Nonr-3963 (15)

Descriptors: (*Two-phase flow, Physical properties), Acoustic properties, Oscillation, Gas flow, Liquids, Thermodynamics, Velocity, Laminar flow, Bubbles, Wave transmission, Propagation, Heat transfer.
Identifiers: Gas dynamics.

A natural and forced convection closed loop with three, parallel, vertical, transparent, heated channels with a constant pressure drop maintained across the heated channels, employing refrigerant 113 as the test fluid, was constructed and operated. Regions of uniform and oscillating flow were mapped for the following range of variables: (a) pressure level at the heated section inlet, 10-20 psig; (b) inlet subcooling to 90F; (c) mass flow rate per test section to 1200 lbm/hr; (d) uniform heat flux to 16,000 BTU/hr-sq ft. The state of the art in the measurement and prediction of the acoustic velocity in one and two-components two-phase mixtures and flows was reviewed and summarized. As the void fraction of a two-phase gas-liquid mixture increases continuously from zero to approximately 60 per cent, the propagation velocity of a pressure wave in the two-phase mixture decreases from its value in the liquid phase to a minimum and begins to rise. At the point where the liquid phase ceases to be continuous there can be a rapid rise in propagation velocity to a value approaching that in the gas phase alone. However, it was observed that in the range of void fractions, from 0.6 to 1.0, there is a range of propagation speeds which depends on the frequency of the propagating signal, the size distribution of discontinuous phase, the nature of the continuous phase, and the strength of the disturbance. (Author)
AD-666 618 HC$3.00 MF$0.65

EFFECTS OF RADIATED AERODYNAMIC NOISE ON MODEL BOUNDARY-LAYER TRANSITION IN SUPERSONIC AND HYPERSONIC WIND TUNNELS.
Arnold Engineering Development Center Arnold Air Force Station Tenn
For primary bibliographic entry see Field 22B.
AD-666 644 HC$3.00 MF$0.65

LENINGRAD UNIVERSITY. HERALD, VOL. 19, NO. 22, PHYSICS AND CHEMISTRY SERIES. No 0. 4, 1964.
Foreign Technology Div Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 20H.
AD-666 727 HC$3.00 MF$0.65

STUDYING FLOW AROUND ELLIPTICAL CONES,
Foreign Technology Div Wright-Patterson AFB Ohio
A. I. Shvets. 8 Sep 67, 15p Rept no. FTD-HT-67-70
Unedited rough draft trans. of Akademiya Nauk SSSR. Izvestiya. Mekhanika Zhidkosti i Gaza. n1 p130-7 1966, tr. by L. Marokus.

Descriptors: (*Conical bodies, Flow fields), Three-dimensional flow, Transonic characteristics, Supersonic characteristics, Wind tunnel models, Ellipsoids, Model tests, Angle of attack, Roll, Yaw, Slender bodies, Shock waves, USSR.
Identifiers: Translations.

An experimental investigation of three-dimensional transonic and supersonic flows past elliptic cones in an aerodynamic wind tunnel is presented. Six models of elliptic cones with different eccentricities and half-cone angles were investigated. The results are presented in graphs and compared with

available theoretical and experimental data obtained by many authors. The comparisons show that the nonlinear thinbody theory agrees satisfactorily with experimental data for slender elliptic cones in a limited range of M; however, the theoretical values lie substantially lower than the experimental values, in proportion to the increases in flow velocity and cone width. Various methods used for calculating supersonic and hypersonic flows around conic bodies are reviewed, analyzed, and at times compared. Comparisons of methods such as tangential and equivalent-cone with the improved equivalent-cone method of Willi F. Jacobs show that the results of the first two agree satisfactorily with experiment only for bodies which do not deviate substantially from circular cones, though those obtained by the third method agree much better with experimental data. Optical investigations of all models at low M numbers showed that the shock fronts retain the same form of nearly circular cones and the local angle of the compression shock depends more on surface distribution along the body axis than on the shape of the body cross section. As the flow velocity increases, the shape of the shock wave in the section normal to the direction of flow approaches the shape of the body and the compression shock takes a conic, nonaxisymmetric form. (Author)
AD-666 740 HC$3.00 MF$0.65

THE ADDITION OF SECONDARY SHOCK CAPABILITY AND MODIFICATIONS TO THE GASL THREE-DIMENSIONAL CHARACTERISTICS PROGRAM. PART II. USER'S AND PROGRAMMER'S MANUAL.
Final rept. Apr 66-May 67,
General Applied Science Labs Inc Westbury N Y
Gertrude Weilerstein. 16 Aug 67, 377p Rept no. GASL-TR-653-Pt-2
Contract DA-01-021-AMC-14889 (Z)
See also Part 1, AD-659 808.

Descriptors: (*Three-dimensional flow, *Computer programs), Shock waves, Flow fields, Blunt bodies, Instruction manuals, Angle of attack, Secondary flow, Flared afterbodies, Two-dimensional flow, Subroutines, Input-output devices.
Identifiers: Pointed bodies, IBM 7090/94, Sharp bodies, Inviscid flow.

The report is the User's and Programmer's Manual for the complete set of IBM 7090/94 programs which calculate the flow field about spherically tipped and pointed bodies at angles of attack, with an option for secondary shocks caused by flares. Included are a description of the program, inputs, outputs and operational procedures. (Author)
AD-666 742 HC$3.00 MF$0.65

METHODS FOR MEASURING LARGE HEAT FLUXES,
Foreign Technology Div Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 20M.
AD-666 743 HC$3.00 MF$0.65

MEASUREMENT OF AERODYNAMIC DERIVATIVES IN WIND TUNNELS AND IN FLIGHT. PART I. RESEARCH IN WIND TUNNELS. PART II. DETERMINATION IN FLIGHT OF THE AERODYNAMIC COEFFICIENTS OF AN AIRCRAFT BY THE STUDY OF ITS FREQUENCY RESPONSE,
Redstone Scientific Information Center Redstone Arsenal Ala Translation Branch
For primary bibliographic entry see Field 1C.
AD-666 793 HC$3.00 MF$0.65

A METHOD FOR PREDICTING THE TRIM CONSTANTS AND THE ROTOR-BLADE LOADINGS AND RESPONSES OF A SINGLE-ROTOR HELICOPTER.
Cornell Aeronautical Lab Inc Buffalo N Y
For primary bibliographic entry see Field 1C.
AD-666 802 HC$3.00 MF$0.65

THE INCOMPRESSIBLE COANDA FLOW AROUND CIRCULAR CYLINDER AFFECTED BY SOUND ENERGY.
Technical rept. 1 Nov 64-28 Feb 66,
Catholic Univ of America Washington D C Dept of Mechanical Engineering
Paul K. Chang, Mario J. Casarella, and William J. Kelnhofer. 28 Feb 66, 90p
Contract DA-49-186-AMC-93 (D)

Descriptors: (*Incompressible flow, Coanda effect), Cylindrical bodies, Sound, Energy, Flow separation, Velocity, Vortices, Momentum, Acoustics, Shear stresses, Boundary layer, Pressure, Frequency.
Identifiers: *Acoustic streaming.

The sound energy causes a noticeable effect on the velocity profile and does, in fact, shift the point of detachment. Prior to detachment, the results indicate that the sound energy superimposes a clockwise vortex flow pattern on the original Coanda flow. This causes a decrease in the total momentum of the shear layer below the neutral point (the point in the velocity profile unaffected by sound) and increases the momentum above the neutral point. The decibel level of the sound pressure and the frequency of the sonic excitation will also affect the structure of the shear layer. The boundary layer around the cylinder grows more rapidly with increasing sound pressure level. (Author)
AD-666 806 HC$3.00 MF$0.65

AN ANALYSIS OF THE EFFECT OF A POLYMER ADDITIVE ON TURBULENT WALL FRICTION AND PRESSURE FLUCTUATIONS,
Research rept.,
Navy Underwater Sound Lab New London Conn
Frank M. White. 29 Dec 67, 68p Rept no. USL-881

Descriptors: (*Laminar flow, Polymers), (*Polymers, Lubricants), Drag, Friction, Reduction, Additives, Pressure, Turbulence, Boundary layer, Pipes, Noise, Flat plate models, Walls.
Identifiers: Non-Newtonian fluids.

The analysis first shows that flat plate drag reduction by polymers is also due merely to the thickening of the sublayer. Even though the plate friction decrease can be very large, the study then shows that the turbulent wall pressure is almost unaffected by the presence of the additive. The calculations of flow noise reveal that the additive has much the same effect as a favorable pressure gradient in Newtonian flow, namely, almost no change in mean pressure level but a small increase in the convection speed and the longitudinal correlation length. Tables and graphs show the estimated effect of various polymers on both friction and turbulent wall pressure. (Author)
AD-666 818 HC$3.00 MF$0.65

THE EFFECT OF A GAP ON A FULLY CAVITATING FLAT PLATE WITH A FLAP.
California Inst of Tech Pasadena Hydrodynamics Lab
D. P. Wang. 20 Mar 67, 21p
Contract Nonr-220 (52)
Revision of report dated 8 Sep 66.
Availability: Published in Quarterly Journal of Mechanics and Applied Mathematics, v21 pt1 p115-34 1968.

Descriptors: (*Hydrofoils, Hydrodynamic configurations), Cavitation, Orifices, Jets, Wake, Mathematical models, Flaps, Two-dimensional flow, Flat plate models.
Identifiers: Supercavitating hydrofoils.

A wake model based on the free-streamline theory is constructed to study the effect of a gap at the hinge point of a fully cavitating flat plate hydrofoil with a flap. The hydrodynamic forces acting on the hydrofoil with the presence of a hinge gap are obtained and the numerical results are compared with the available experimental data. Furthermore, an example on the control of the direction of the jet, issuing out from the hinge gap into the vapour-filled cavity, is also given. (Author)
AD-666 857 Not available from CFSTI.

CORRECT FORMULATION OF AIRFOIL PROBLEMS IN MAGNETOAERODYNAMICS.
Cornell Univ Ithaca N Y
For primary bibliographic entry see Field 20I.
AD-666 871 Not available from CFSTI.

PARAMETERS GOVERNING THE GENERATION OF FREE VORTICES.
TRW Systems Redondo Beach Calif
For primary bibliographic entry see Field 4A.
AD-666 890 Not available from CFSTI.

EFFECTS OF NONEQUILIBRIUM AND MASS TRANSFER ON A BLUNT OGIVE PRESSURE DISTRIBUTION.
Arnold Engineering Development Center Arnold Air Force Station Tenn
For primary bibliographic entry see Field 22B.
AD-666 910 HC$3.00 MF$0.65

OBSERVATIONS ON THE INFLUENCE OF AMBIENT PRESSURE ON BOUNDARY-LAYER TRANSITION.
Final rept. 1 Mar-31 Oct 67,
Arnold Engineering Development Center Arnold Air Force Station Tenn
J. Leith Potter. Mar 68, 23p Rept no. AEDC-TR-68-36
Contract AF 40 (600)-1200
Prepared in cooperation with ARO, INC., Tullahoma, Tenn.

Descriptors: (*Boundary layer transition, *Reynolds number), (*Free flight models, Boundary layer transition), Sound, Pressure, Temperature, Aerodynamic noise, Mach number, Conical bodies, Aluminum alloys, Launching.

For at least 15 yrs it has been known that the Reynolds number characterizing transition form laminar to turbulent boundary-layer flow (based on local properties and wetted length to transition) may be influenced by the local unit Reynolds number or some still unidentified, related quantity under both subsonic and supersonic conditions. Because examples of this were available almost exclusively from wind tunnel work, and because of the possibility that free-stream disturbances were responsible, there has been uncertainty as to whether the so-called unit Reynolds number effect exists in atmospheric free flight. The study described in the report was conducted in a free-flight range, thereby circumventing 'wind tunnel effects,' and it has resulted in a demonstration of the variation of transition Reynolds number with range pressure (or unit Reynolds number) under conditions of fixed Mach number and average wall temperature ratio. Some preliminary measurements of sound pressures in the range air are reported for comparison with published results for wind tunnels. (Author)
AD-666 911 HC$3.00 MF$0.65

THE NON-SIMILAR BOUNDARY LAYER WITH BLOWING,
Aerospace Corp El Segundo Calif Lab Operations
William S. King. Feb 68, 44p Rept no. TR-0158 (3240-10)-7
SAMSO-TR-68-97
Contract F04695-67-C-0158

Descriptors: (*Incompressible flow, Boundary layer), (*Boundary layer, Injection), Nonlinear systems, Laminar flow, Hypersonic characteristics, Numerical analysis, Compressible flow, Mass transfer, Heat transfer, Shear stresses, Equations of motion, Pressure, Thickness, Flat plate models.
Identifiers: Inviscid flow, *Blowing.

A generalized method is proposed for the numerical and analytical solution of non-similar boundary layer flows with fluid injection. For a given mass injection distribution and external pressure gradient, solutions can be obtained which do not depend on the magnitude of the injected flow rate. Instead, variations in the magnitude of the injected

flow are associated with variations in a transformed tangential coordinate. The method is used to generalize a previously obtained numerical solution for the incompressible boundary layer flow over a flat plate with uniform mass injection to the compressible case, and to obtain a solution for the strong interaction of a hypersonic inviscid flow with the boundary layer on a flat plate with uniform mass injection. Numerical results in which the wall temperature is the only parameter are given for the latter case. It is shown that the injected mass flow tends to increase the induced pressure and displacement thickness, and to decrease the heat transfer and wall shear. The wall temperature has a significant effect on the dimensionless pressure and displacement thickness, and a smaller but noticeable effect on the dimensionless heat transfer and shear. (Author)
AD-666 913 HC$3.00 MF$0.65

POSTFLIGHT (AS-202) APOLLO COMMAND MODULE AERODYNAMIC SIMULATION TESTS.
Arnold Engineering Development Center Arnold Air Force Station Tenn
For primary bibliographic entry see Field 22B.
AD-666 927 HC$3.00 MF$0.65

INVESTIGATION OF A TWO-DIMENSIONAL FULLY STALLED TURBULENT FLOW FIELD,
Stanford Univ Calif Thermosciences Div
For primary bibliographic entry see Field 21H.
AD-666 931 HC$3.00 MF$0.65

EFFECT OF AN AMBIENT TURBULENCE COMPONENT ON MODEL CARRIER TURBULENCE DATA.
Naval Ship Research and Development Center Washington D C Aerodynamics Lab
For primary bibliographic entry see Field 13J.
AD-666 958 HC$3.00 MF$0.65

RADIATION COUPLED SHOCK LAYER INCLUDING UPSTREAM ABSORPTION EFFECTS.
Massachusetts Inst of Tech Cambridge Aerophysics Lab
For primary bibliographic entry see Field 22B.
AD-667 009 Not available from CFSTI.

PERTURBATIONS OF PLANE AND AXISYMMETRIC ENTROPY LAYERS.
Revised ed.,
Cornell Univ Ithaca N Y
A. R. George. 19 Jun 67, 8p
AFOSR-68-0571
Contract AF 49 (638)-1346
Presented as Paper 67-6 at the AIAA Aerospace Sciences Meeting, (5th) 23-26 Jan 67, New York.
Revision of report dated 5 Jan 67.
Availability: Published in AIAA Journal, v5 n12 p2155-60 Dec 19 67.

Descriptors: (*Supersonic flow, Perturbation theory), Boundary layer, Entropy, Axially symmetric flow, Shock waves, Flow fields, Vortices, Linear systems, Blunt bodies, Partial differential equations, Integration.
Identifiers: Nonuniform flow, Inviscid flow.

The vorticity that is introduced into flowfields by strong curved shock waves considerably increases the difficulty of analyzing downstream flows. Even if the flow becomes nearly parallel again, the reflection and re-reflection of waves by entropy variations invalidates the usual approaches such as ordinary linearized theory, shock expansion methods, etc. The paper treats inviscid linearized perturbations of supersonic entropy layers. The flows induced by small angle flaps or flares on blunted plane or axisymmetric bodies are examples of such flows. Stripwise approximations are used to reduce the governing partial differential equations to a set of simultaneous ordinary differential equations. The formulation of 'difference,' 'integral relations,' and hybrid approximation is discussed. Analytic results are obtained in the plane case whereas the axisymmetric case requires numerical integration. Direct comparisons of the difference and integral results for varying numbers of strips show that in the present problem the difference approach is somewhat more accurate for a small number of strips. Simple approximate results are obtained for a single strip whereas accuracy comparable to characteristics is obtained for a large number of strips. The methods, which are applicable to many other problems, are easily programmed for computer derivation as well as computer solution. (Author)
AD-667 014 Not available from CFSTI.

WALL TEMPERATURE EFFECT ON INCIPIENT SEPARATION.
Revised ed.,
Aerospace Research Labs Wright-Patterson AFB Ohio
K. O. W. Ball. 7 Aug 67, 5p Rept no. ARL-68-0011
Revision of report dated 17 May 67.
Availability: Published in AIAA Journal, v5 n12 p2283-4 Dec 1967.

Descriptors: (*Boundary layer transition, Flow separation), Laminar boundary layer, Wedges, Leading edge, Stagnation point, Temperature, Walls.
Identifiers: Sharp bodies.

An extension of Hankey's analysis of wedge-induced laminar boundary-layer separation on a sharp leading edge flat plate was made, including the effect of the wall-to-stagnation temperature ratio.
AD-667 021 Not available from CFSTI.

COMPRESSIBLE LAMINAR MHD FLOW INSIDE A FLAT DUCT WITH HEAT TRANSFER.
Revised ed.,
Kansas State Univ Manhattan
U. P. Hwang, L. T. Fan, and C. L. Hwang. 6 Jun 67, 11p Rept no. Reprint-137
AFOSR-68-0598
Grant AF-AFOSR-463-66
Revision of report dated 27 Feb 67.
Availability: Published in AIAA Journal, v5 n12 p2113-21 Dec 1967.

Descriptors: (*Compressible flow, Ducts), Two-dimensional flow, Laminar flow, Compressible flow, Magnetic fields, Boundary layer, Differential equations, Integration, Surface temperatures, Pressure, Prandtl number, Heat transfer, Skin friction.

The study presents an analysis of two-dimensional, steady state, laminar, compressible flow of an electrical conducting fluid inside a flat duct with a transversely applied magnetic field. The boundary layer equations for the compressible MHD flow are solved by a new approach based on Morris and Smith's work on non-MHD flow. The compressible boundary layer equations including the continuity, momentum, and energy equations are reduced to ordinary differential equations which are solved simultaneously by numerical integration. The effect of compressibility, pressure, and surface temperature gradients on the characteristics of the boundary layer are solved simultaneously without imposing any restrictions on the Prandtl number. A very general form of viscosity variation with respect to temperature is used in the development of the general equations. (Author)
AD-667 037 Not available from CFSTI.

PRESSURE DISTRIBUTION ON A HYPERSONIC DELTA WING OF DIAMOND CROSS-SECTION,
Douglas Aircraft Co Inc Santa Monica Calif Missile and Space Systems Div
For primary bibliographic entry see Field 1C.
AD-667 066 HC$3.00 MF$0.65

A CHARACTERISTICS APPROACH TO RADIATION GASDYNAMICS,
Massachusetts Inst of Tech Cambridge Dept of Aeronautics and Astronautics
For primary bibliographic entry see Field 22B.
AD-667 097 Not available from CFSTI.

APPROXIMATE ANALYSIS OF LINEARIZED INVISCID RELAXING GAS FLOW,
Massachusetts Inst of Tech Cambridge Aerophysics Lab
For primary bibliographic entry see Field 22B.
AD-667 098 Not available from CFSTI.

SPECIFIC VOLUMES OF WATER AT HIGH PRESSURES, OBTAINED FROM ULTRASONIC-PROPAGATION MEASUREMENTS,
Harvard Univ Cambridge Mass
Rajagopalan Vedam, and Gerald Holton. 26 Apr 67, 10p
Contract Nonr-1866 (19)
Prepared for presentation at the Meeting of the American Physical Society, Apr 67.
Availability: Published in The Journal of the Acoustical Society of America, v43 n1 p108-16 1968.

Descriptors: (*Water, Volume), (*Volume, Measurement), High-pressure research, Sound transmission, Ultrasonic properties, Temperature, Equations of state, Velocity, Barometric pressure, Specific heat, Thermal expansion.
Identifiers: Specific volume.

A computer-aided procedure has been developed for obtaining specific volumes from measured ultrasonic velocities in any nondispersive medium. Newly measured velocities up to 80 degrees C and 10,000 kg/sq cm have yielded values of specific volumes and a number of thermodynamic coefficients for water over this same range. P. W. Bridgman's measurements of specific volumes in the high-pressure range showed systematic differences of a few tenths of a percent; the present calculations yield values believed to be good to 0.05% or better for most of the range. (Author)
AD-667 111 Not available from CFSTI.

ANALYSIS OF SOME RANDOM BLENDING PROCESSES.
City Coll New York Dept of Chemical Engineering
For primary bibliographic entry see Field 7A.
AD-667 120 Not available from CFSTI.

RESIDENCE TIME DISTRIBUTIONS IN SYSTEMS WITH INTERNAL REFLUX.
City Coll New York
For primary bibliographic entry see Field 7A.
AD-667 121 Not available from CFSTI.

STUDY OF TURBULENCE CLOSE TO A SOLID WALL,
Illinois Univ Urbana Dept of Chemistry and Chemical Engineering
Thomas J. Hanratty. 8 Mar 68, 10p
AFOSR-68-0612
Grant AF-AFOSR-547-67
Availability: Published in Physics of Fluids Supplement, Boundary Layers and Turbulence, pS126-33 1967.

Descriptors: (*Turbulence, *Mass transfer), Boundary layer, Velocity, Diffusion, Flow fields, Electrochemistry, Fluid flow, Shear stresses, Walls.
Identifiers: Shear flow.

Electrochemical techniques were used to determine (1) the local average and fluctuating mass transfer rates in a large mass transfer surface; (2) local average and fluctuating velocity gradient at the wall; and (3) the limiting value of the eddy diffusion coefficient at the wall. These results reflect properties of the fluctuating flow field at locations

much closer to the wall that can be examined with the hot-wire anemometer. (Author)
AD-667 124 Not available from CFSTI.

INSTABILITY OF RE-ATTACHING FLOWS,
Von Karman Inst for Fluid Dynamics Rhode-Saint-Genese (Belgium)
Jean J. Ginoux. 19 Mar 68, 3p
AFOSR-68-0626
Grant AF-EOAR-09-67
Prepared in cooperation with Brussels Univ. (Belgium).
Availability: Published in Physics of Fluids, v10 n9 pt2 p5305 Sep 1967.

Descriptors: (*Boundary layer transition, Stability), Laminar flow, Turbulence, Flow separation, Supersonic characteristics, Hypersonic characteristics, Thickness, Control surfaces, Interactions, Models (Simulations), Vortices, Thermodynamics.
Identifiers: Re-attaching flows.

It is now generally accepted that the stage of the laminar-turbulent process which follows the region of growing Tollmien-Schlichting waves, is one of developing transverse variations in the boundary-layer velocity and wave intensity. These transverse variations were systematically observed in re-attaching high-speed flows over a range of Mach numbers of 1.5 to 7.0, with a wavelength which was a function of the boundary-layer thickness. Separation was caused by various means such as shock-wave boundary-layer interactions, cavities, backward and forward facing steps, and deflected control surfaces. Two-dimensional models were used as well as hollow cylinders. Refined measurements made with small pitot-static probes and hot wires showed that these variations were caused by equally spaced counter-rotating stream-wise vortices located inside the re-attaching boundary-layers. Very local measurements showed that large transverse variations of heat rates existed in the re-attachment region of the flow because of these vortices. Although the mean value of the Stanton number was very near the turbulent value, its local values was much higher than the latter. (Author)
AD-667 126 Not available from CFSTI.

A SOURCE FLOW MODEL FOR CONTINUUM GAS-PARTICLE FLOW,
Polytechnic Inst of Brooklyn Farmingdale N Y
David Migdal, and V. D. Agosta. 14 Feb 68, 8p
AFOSR-68-0615
Contract AF 49 (638)-1263
Prepared in cooperation with Grumman Aircraft Engineering Corporation, Bethpage, N. Y.
Availability: Published in Journal of Applied Physics, p860-5 December 1967.

Descriptors: (*Gas flow, Continuum mechanics), Differential equations, One-dimensional flow, Chemical reactions, Mathematical models, Thermodynamics, Particles, Ducts, Equations of motion.

A system of differential equations is derived from basic laws of mass conservation dynamics and thermodynamics for a gas-particle reacting system. The concept of two superimposed continua occupying the same control volume is used throughout. A number of terms appearing in the basic equations, physically identified with the presence of particles, are phenomenological relations for these terms and the thermodynamic variables, a complete set of differential equations is obtained. The equations governing the one-dimensional flow in an arbitrarily shaped duct are presented as a special case. (Author)
AD-667 135 Not available from CFSTI.

VISCOUS FLOW IN A PIPE WITH ABSORBING WALLS.
Interim rept.,
Weizmann Inst of Science Rehovoth (Israel) Dept of Applied Mathematics
Mehahem Friedman, and Joseph Gillis. Nov 67,5p
AFOSR-68-0599
Grant AF-EOAR-38-66
Prepared for presentation at the Winter Annual meeting of The American Society of Mechanical Engineers, Pittsburgh, Pa. 12-17 Nov 67.
Availability: Published in Journal of Applied Mathematics, n67 p1-4 1967, paper no. 67-WA/APM-23.

Descriptors: (*Liquids, Axially symmetric flow), Pipes, Absorption, Walls, Equations of motion, Navier-Stokes equations, Incompressible flow, Israel.

A study is made of the steady-state axisymmetric flow of a homogeneous viscous liquid in a straight circular pipe with absorbing walls. The complete equations are solved numerically and the streamlines and other features of the flow are computed. Comparison is made with earlier results obtained by various approximate methods. (Author)
AD-667 136 Not available from CFSTI.

INTERACTION OF THE LAMINAR BOUNDARY LAYER WITH FREE-STREAM TURBULENCE,
Princeton Univ N J Dept of Aerospace and Mechanical Sciences
William O. Criminale, Jr. 18 Mar 68, 9p
AFOSR-68-0627
Contract AF 49 (638)-1656
Availability: Published in Physics of Fluids Supplement, Boundary Layer and Turbulence, pS101-7 1967.

Descriptors: (*Laminar boundary layer, Turbulence), Turbulence, Interactions, Theory, Turbulent boundary layer, Equations of motion, Response, Mathematical models, Flat plate models.

A theory is presented which directs the investigation towards an understanding of the effect of the addition of small fluctuations to the free stream of the flow field caused by the laminar boundary layer over a flat plate. It is shown that this problem is no longer one of the eigenvalue variety and a response impedance of the boundary layer must be computed in order to determine the fate of any perturbation. The system is very selective and indications are that it bears a strong analogy to the viscous sublayer of a fully turbulent boundary layer. (Author)
AD-667 138 Not available from CFSTI.

A COMPUTER STUDY OF AN ANALYTICAL MODEL OF BOUNDARY LAYER TRANSITION,
Aeronautical Research Associates of Princeton Inc N J
Coleman duP. Donaldson. 13 Mar 68, 14p
AFOSR-68-0617
Contracts AF 49 (638)-1629, AF 04 (694)-914
Research supported in part by General Electric Co., Philadelphia, Pa. Missile and Space Div.
Availability: Published in Proceedings of AIAA Aerospace Sciences Meeting (6th), 14p New York, New York 22-24 Jan 68. Rept. no. AIAA Paper-68-38.

Descriptors: (*Boundary layer transition, Mathematical models), Laminar boundary layer, Turbulent boundary layer, Flat plate models, Kinetic energy, Stability, Stagnation point, Blunt bodies, Two-dimensional flow, Three-dimensional flow.
Identifiers: Computer analysis.

The results of a computer study of a new analytical model of transition from laminar to turbulent flow are presented. The model is two-dimensional in the mean flow but three-dimensional in the disturbance flow. In particular, an onset of transition boundary is derived for the case of fairly large disturbances introduced into a laminar flat plate boundary layer at approximately the critical layer. It is found that the upper branch of this curve is defined by a balance of dissipative effects and tendency-towards-isotropy effects as they affect the normal component of turbulent kinetic energy in the boundary layer. The lower branch is defined by a balance of diffusive effects and tendency-towards-isotropy effects on the same normal velocity correlation. Within the framework of these observations, the effect of a 'favorable' pressure gradient on transition is discussed. It is suggested that the conventional approach to computing the stability boundaries of laminar flows in the presence of pressure gradient is incorrect in that it does not account for stream-tube stretching effects which are shown to be important in a region near the stagnation point of blunt bodies. Finally, the nature of a complete transition, as defined by the model, is discussed, and several suggestions for future research are put forth. (Author)
AD-667 157 Not available from CFSTI.

PLANE LAMINAR JET,
Polytechnic Inst of Brooklyn Farmingdale N Y
Stanley G. Rubin, and Robert Falco. 19 Mar 68, 4p
AFOSR-68-0633
Contract AF 49 (638)-1623
Availability: published in AIAA Journal, v6 n1 p186-7 Jan 1968.

Descriptors: (*Jets, Two-dimensional flow), Laminar flow, Axially symmetric flow, Reynolds number, Equations of motion, Orifices.

The behavior of a two-dimensional symmetric jet that emanates from a point orifice into a fluid at rest is of basic fluid dynamics interest. The purposes of the note are twofold: (1) to demonstrate the existence of a set of eigensolutions, obtained by linearizing about the basic Schlichting-Bickley flow, which may be useful in satisfying initial conditions somewhat perturbed from those accepted by the asymptotic solution; and (2) to obtain higher-order, inner and outer solutions in terms of the small parameter 1/R. R is the Reynolds number defined as R = (Mx/pv squared) to the 1/2 power much greater than 1. M is the momentum per unit width emanating from the orifice, p and v the density and kinematic viscosity, respectively, and x the distance measured downstream from the orifice. (Author)
AD-667 159 Not available from CFSTI.

EXPERIMENTAL INVESTIGATION OF SUPERSONIC LAMINAR, TWO-DIMENSIONAL BOUNDARY-LAYER SEPARATION IN A COMPRESSION CORNER WITH AND WITHOUT COOLING.
California Inst of Tech Pasadena Graduate Aeronautical Labs
For primary bibliographic entry see Field 22B.
AD-667 163 Not available from CFSTI.

FAR WAKE BEHIND CYLINDERS AT HYPERSONIC SPEEDS: II. STABILITY.
California Inst of Tech Pasadena Graduate Aeronautical Labs
For primary bibliographic entry see Field 22B.
AD-667 164 Not available from CFSTI.

BOUNDARY-LAYER FLOWS WITH LARGE INJECTION AND HEAT TRANSFER.
Revised ed.,
California Inst of Tech Pasadena Graduate Aeronautical Labs
Toshi Kubota, and Frank L. Fernandez. 14 Jul 67, 7p Rept no. GALCIT-Pub-641
Contract DA-31-124-ARO (D)-33
Revision of report dated 10 Mar 67.
Availability: Published in AIAA Journal, v6 n1 p22-8 1967.

Descriptors: (*Laminar boundary layer, Transport properties), Injection, Mass transfer, Heat transfer, Compressible flow, Boundary layer transition, Asymptotic series, Skin friction, Pressure.
Identifiers: Inviscid flow.

The effect of large mass injection on the compressible, similar laminar boundary with favorable

pressure gradient was examined. It is found that for high rates of injection, the boundary layer may be divided into two regions: (1) an inner region adjacent to the surface where the viscosity plays a minor role, (2) the viscous layer where the transition occurs from the inner layer to the inviscid flow outside the boundary layer. Matched asymptotic expansions appropriate for large injection rates were constructed for each layer and a uniformly valid solution was obtained. In the case of the insulated wall, it turns out that the viscous outer layer contributes only small corrections to properties of the boundary layer. In the case of the highly cooled wall, on the other hand, the boundary layer is dominated by the viscous mixing between the inviscid outer flow and the high-density, low-speed gas adjacent to the wall. Simple expressions for heat-transfer rates, skin friction, and approximations for integral properties of the boundary layer were derived, which are useful in future application in nonsimilar boundary-layer calculations. (Author)
AD-667 165 Not available from CFSTI.

LAMINAR SEPARATION IN HYPERSONIC FLOWS FINAL SCIENTIFIC REPORT, 1 OCT. 1966 - 30 SEP. 1967.
Von Karman Inst. for Fluid Dynamics, Rhode Saint-genese (Belgium).
For primary bibliographic entry see Field 1A.
For abstract, see STAR 06 09.
N68-18612 HC$3.00 MF$0.65

SIMULATED LOW-GRAVITY SLOSHING IN SPHERICAL TANKS AND CYLINDRICAL TANKS WITH INVERTED ELLIPSOIDAL BOTTOMS.
Southwest Research Inst., San Antonio, Tex. Dept. of Mechanical Sciences.
F. T. Dodge, and L. R. Garza. Feb 68, 42p NASA-CR-61583, TR-6
Contract NAS8-20290

Descriptors: *Cylindrical tanks, *Liquid sloshing, *Spherical tanks, *Weightlessness simulation, Damping, Ellipsoids, Resonant frequencies.

For abstract, see STAR 06 09.
N68-18663 HC$3.00 MF$0.65

COMPARISON OF THE MACH 3.0 AERODYNAMIC CHARACTERISTICS OF TENSION STRING, TENSION SHELL, AND 120 DEG CONICAL SHAPES.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
For primary bibliographic entry see Field 1A.
For abstract, see STAR 06 09.
N68-18720 HC$3.00 MF$0.65

AN EXPERIMENTAL STUDY OF THE INFLUENCE OF THE TURBULENT BOUNDARY LAYER ON PANEL FLUTTER.
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
For primary bibliographic entry see Field 1A.
For abstract, see STAR 06 09.
N68-18721 HC$3.00 MF$0.65

EFFECT OF CURVED SURFACES ON TURBULENT BOUNDARY LAYERS.
Turbulente Grenzschichten An Gewoelbten Flaechen
National Aeronautics and Space Administration, Washington, D. C.
H. Wilcken. Dec 67, 36p NASA-TT-F-11421
Tran- Transl. Into English From German

Descriptors: *Concavity, *Convexity, *Curvature, *Turbulent boundary layer, Elastic properties, Experimental design, Pressure measurements, Velocity distribution.

For abstract, see STAR 06 09.
N68-18731 HC$3.00 MF$0.65

AERODYNAMIC CHARACTERISTICS FOR CONE CYLINDER FRUSTRUM CYLINDER CONFIGURATIONS AT MACH NUMBERS FROM 0.7 TO 1.96. VOLUME 1 - LINEAR LOAD DISTRIBUTIONS.
Lockheed Missiles and Space Co., Huntsville, Ala. Research and Engineering Center.
For primary bibliographic entry see Field 1A.
For abstract, see STAR 06 09.
N68-18765 HC$3.00 MF$0.65

STUDY OF FLUID TRANSIENTS IN CLOSED CONDUITS INTERIM REPORT.
Oklahoma State Univ., Stillwater. Fluid Power and Controls Lab.
C. R. Gerlach. 27 Jun 66, 171p NASA-CR-61622, IR-65-4
Contract NAS8-11302

Descriptors: *Dynamic response, *Fluid transmission lines, *Navier-stokes equation, *Pipes (tubes), *Viscous fluids, Compressible flow, Compressible fluids, Flow visualization, Mathematical models, Propagation modes, Velocity distribution.

For abstract, see STAR 06 09.
N68-18778 HC$3.00 MF$0.65

CONICAL BODIES OF GIVEN LENGTH AND VOLUME HAVING MAXIMUM LIFT-TO-DRAG RATIO AT HYPERSONIC SPEEDS - DIRECT METHODS.
Rice Univ., Houston, Tex. Dept. of Mechanical and Aerospace Engineering and Materials Science.
For primary bibliographic entry see Field 1A.
For abstract, see STAR 06 09.
N68-18830 HC$3.00 MF$0.65

ANALYTICAL AND EXPERIMENTAL STUDY OF LIQUID-ULLAGE COUPLING AND LOW GRAVITY INTERFACE STABILITY FINAL REPORT, 1 JUN. 1965 - 29 AUG. 1966.
Lockheed Missiles and Space Co., Sunnyvale, Calif.
For primary bibliographic entry see Field 21I.
For abstract, see STAR 06 09.
N68-18848 HC$3.00 MF$0.65

FORCES AND MOMENTS PRODUCED BY AIR AND HELIUM JETS EXHAUSTING PARALLEL TO A FLAT PLATE IN A NEAR VACUUM.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
For primary bibliographic entry see Field 1A.
For abstract, see STAR 06 09.
N68-19000 HC$3.00 MF$0.65

STABILITY OF ONE-DIMENSIONAL COMPRESSIBLE FLOWS.
Israel Inst. of Tech., Haifa. Dept. of Aeronautical Engineering.
For primary bibliographic entry see Field 1A.
For abstract, see STAR 06 09.
N68-19003 HC$3.00 MF$0.65

FUNDAMENTALS OF THE AERODYNAMICS OF HYPERSONIC VELOCITIES.
Techtran Corp., Glen Burnie, Md.
For primary bibliographic entry see Field 1A.
For abstract, see STAR 06 09.
N68-19022 HC$3.00 MF$0.65

TURBULENT BOUNDARY LAYER OF A DISSOCIATED GAS AT THE INLET SECTION OF A TUBE.
Aztec School of Languages, Inc., Acton, Mass. Research Translation Div.
For primary bibliographic entry see Field 1A.
For abstract, see STAR 06 09.
N68-19026 HC$3.00 MF$0.65

THREE-FRONT CONFIGURATIONS WITH ENERGY ADDITION.
Royal Aircraft Establishment, Farnborough (England).
For primary bibliographic entry see Field 1A.
For abstract, see STAR 06 09.
N68-19058 HC$3.00 MF$0.65

EFFECT OF TWO-DIMENSIONAL MULTIPLE SINE-WAVE PROTRUSIONS OF THE PRESSURE AND HEAT-TRANSFER DISTRIBUTIONS FOR A FLAT PLATE AT MACH 6.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
For primary bibliographic entry see Field 1A.
For abstract, see STAR 06 09.
N68-19063 HC$3.00 MF$0.65

THE ANALYSIS OF TURBULENCE FROM DATA OBTAINED WITH A LASER VELOCIMETER.
National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
For primary bibliographic entry see Field 20E.
For abstract, see STAR 06 09.
N68-19078 HC$3.00 MF$0.65

FLUTTER OF CORRUGATION STIFFENED PANELS AT MACH 3 AND COMPARISON WITH THEORY.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
For primary bibliographic entry see Field 1A.
For abstract, see STAR 06 09.
N68-19143 HC$3.00 MF$0.65

RECENT STUDIES OF NONEQUILIBRIUM FLOWS AT THE CORNELL AERONAUTICAL LABORATORY.
Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
J. G. Hall, and A. L. Russo. 12 Apr 66, 52p NASA-CR-74170
Contract NASR-109
Conf- Presented At 7th Agard Colloq. on Recent Advan. in Aerothermochem., Oslo, 16-20 May 1966

Descriptors: *Nonequilibrium flow, *Nozzle flow, *Reentry physics, Apollo spacecraft, Enthalpy, Flat plates, Gas flow, Plasma sheaths, Supersonic flow, Vibration mode, Wedges.

For abstract, see STAR 06 09.
N68-19190 HC$3.00 MF$0.65

PROGRESS IN DEVELOPING HIGH ENERGY NOZZLE BEAMS.
Toronto Univ. (Ontario). Inst. for Aerospace Studies.
For primary bibliographic entry see Field 1A.
For abstract, see STAR 06 09.
N68-19205 HC$3.00 MF$0.65

SIMILARITY SOLUTION FOR TURBULENT MIXING BETWEEN A JET AND A FASTER MOVING COAXIAL STREAM.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
L. F. Donovan. Mar 68, 27p NASA-TN-D-4441
Contract 122-28-02-16-22

Descriptors: *Coaxial flow, *Jet mixing flow, *Similarity theorem, *Turbulent mixing, Flow equations, Flow geometry, Mathematical models, Navier-stokes equation, Velocity distribution.

For abstract, see STAR 06 09.
N68-19246 HC$3.00 MF$0.65

MODEL FOR FREQUENCY RESPONSE OF A FORCED FLOW, HOLLOW, SINGLE TUBE BOILER.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

E. A. Krejsa. Mar 68, 29p NASA-TM-X-1528
Contract 120-27-04-27-22

Descriptors: *Boilers, *Inlet flow, *Mathematical models, Flow equations, Flow geometry, Frequency response, Perturbation, Pressure distribution, Pressure gradients, Tube heat exchangers.

For abstract, see STAR 06 09.
N68-19340 HC$3.00 MF$0.65

PLANE-FLAME SIMULATION OF THE WAKE BEHIND AN INTERNALLY PROPELLED VEHICLE. PART III. EXPERIMENTAL SIMULATION OF A SUPERSONIC VEHICLE BY A DETONATION.
Doctoral thesis,
Rensselaer Polytechnic Inst., Troy, N. Y. Dept. of Aeronautical Engineering and Astronautics.
John H. Skinner, Jr. Nov 67, 41p TR-AE-6708-Pt-3
Contract C-117-66
Rept. on Proj. TUBEFLIGHT. See also Part 2, PB-177 141.

Descriptors: (*Wake, Simulation), (*Detonation waves, Supersonic characteristics), Adiabatic gas flow, Flow fields, Pipes, Friction, Heat transfer, Test methods, Instrumentation, Shock waves.
Identifiers: Graphs (Charts), Inviscid flow.

The flow field induced by an internally-propelled vehicle traveling through a tube at a supersonic speed is simulated experimentally by the flow field induced by a detonation. The results indicate that as the vehicle continues to travel at a constant velocity, the effects of friction and heat transfer cause a region of flow to develop which is steady in the frame of reference of the vehicle. This steady-flow region starts directly behind the vehicle and gradually grows to fill the entire flow field as time progresses. (Author)
PB-176 924 HC$3.00 MF$0.65

20E. Masers and Lasers

RESEARCH ON ELECTROSTATIC CHARGED DROPLET STREAMS.
TRW Systems Redondo Beach Calif
For primary bibliographic entry see Field 7D.
AD-666 669 HC$3.00 MF$0.65

INVESTIGATION OF ORDERED MAGNETIC STATES AND THEIR CORRELATIONS TO OPTICAL AND ELECTRICAL PROPERTIES OF SELECTED MATERIALS.
Mithras Inc Cambridge Mass
For primary bibliographic entry see Field 20L.
AD-666 676 HC$3.00 MF$0.65

RARE EARTH INFRARED LIFETIMES AND EXCITON MIGRATION RATES IN TRICHLORIDE CRYSTALS.
Johns Hopkins Univ Baltimore Md Dept of Physics
For primary bibliographic entry see Field 7D.
AD-666 791 HC$3.00 MF$0.65

LASER SCINTILLATION CAUSED BY TURBULENCE NEAR THE GROUND.
Research rept. 1 Nov 63-30 May 66,
Michigan Univ Ann Arbor Dept of Mathematics
Donald J. Portman, Edward Ryznar, and Arif A. Waqif. Jan 68, 85p
CRREL-RR-225
Grant DA-AMC-27-021-63-G7

Descriptors: (*Lasers, *Scintillation), (*Atmospheric motion, Propagation), Turbulence, Atmospheric refraction, Diffraction, Atmospheric temperature, Coherent radiation, Polarization, Wind, Spectrum signatures, Theory, Experimental data.

Laser scintillation was measured for a horizontal optical path 500 m long and 1 m high for various conditions of horizontally homogeneous turbulence. Wind direction, average vertical distributions of wind speed and temperature, and, in some cases, turbulent fluctuations of wind velocity were measured simultaneously. The results of the measurements were analyzed in relation to a set of theoretical relationships derived by Tatarski (1961) for electromagnetic wave propagation in turbulent flow. Tatarski's derivation of the scintillation frequency spectrum (at a point in a plane perpendicular to the optical path) in relation to the three-dimensional spectral density of index of refraction inhomogeneities is summarized and interpreted in relation to its validity for various conditions of turbulence. Analysis of the spectral data showed that their characteristics were similar to Tatarski's theoretical spectrum if the divergence of the laser beam, the size of the receiver aperture, the intensity of scintillation and turbulence spectra were considered. (Author)
AD-666 798 HC$3.00 MF$0.65

RAMAN LINEWIDTHS FOR STIMULATED THRESHOLD AND GAIN CALCULATIONS.
Toronto Univ (Ontario) Dept of Physics
For primary bibliographic entry see Field 7D.
AD-666 820 HC$3.00 MF$0.65

FOREIGN SCIENCE BULLETIN, VOL. 4, NO. 3, 1968.
Library of Congress Washington D C Aerospace Technology Div
For primary bibliographic entry see Field 20G.
AD-666 875 HC$3.00 MF$0.65

STRESS EFFECTS ON THE PARAMAGNETIC RESONANCE OF Yb (3+) IN ThO2 AND Ho (2+) IN CaF2,
California Univ Los Angeles Dept of Physics
For primary bibliographic entry see Field 7D.
AD-666 887 Not available from CFSTI.

INVESTIGATION OF CRYSTAL IMPERFECTIONS BY MEANS OF LASER LIGHT SCATTERING.
Air Force Cambridge Research Labs L G Hanscom Field Mass
For primary bibliographic entry see Field 20B.
AD-666 918 HC$3.00 MF$0.65

ENERGY TRANSFER BETWEEN EU2+ AND HO3+ IONS IN CaF2,
Army Electronics Command Fort Monmouth N J Inst for Exploratory Research
T. F. Ewanizky. 22 Jun 67, 2p
Revision of report dated 18 May 67.
Availability: Published in Journal of Applied Physics, v38 n11 p4338-9 Oct 1967.

Descriptors: (*Lasers, Calcium fluorides), (*Calcium fluorides, Spectra (Visible + ultraviolet)), Europium, Holmium, Absorption spectrum, Excitation, Doping, Fluorescence, Line spectrum, Crystal growth.
Identifiers: Energy transfer.

CaF2:Ho3+ has been reported as a visible laser at 5512A. Operation is at a relatively high threshold power due, principally, to weak and narrow absorption lines. Preliminary experiments, using Eu2+ as a sensitizer, have indicated that an order of magnitude increase in Ho3+, 5512-A emission intensity may readily be achieved through transfer of energy from Eu2+ to Ho3+ ions. Dopant concentrations, for each constituent, were nominally <1 mole%. (Author)
AD-667 113 Not available from CFSTI.

OBSERVATIONS ON A CONCENTRIC SPHERICAL CAVITY LASER OSCILLATOR.
Revised ed.,
Army Electronics Command Fort Monmouth N J Electronic Components Lab
J. W. Strozyk. 12 May 67, 6p
Revision of report dated 21 Mar 67.
Availability: Published in IEEE Journal of Quantum Electronics, vQE-3 n8 p343-8 Aug 1967.

Descriptors: (*Lasers, Ruby), Oscillation, Intensity, Periodic variations, Experimental data, Rods, Doping, Energy, Spheres, Population (Mathematics), Photons, Oscilloscopes, Measurement.
Identifiers: Spiking, Decay time, Holes (Cavities), Concentric cavities.

Experimental results on a number of ruby rods in concentric spherical cavities are presented and discussed. The observations include intensity variations (spiking) as a function of input energy, longitudinal and transverse mode structure, and output energy distribution. The characteristics of flat and concentric cavities are compared using the data presented. The spiking frequencies and decay times are compared with simple rate equation predictions during the quasi-CW time of operation with reasonable agreement. Results indicate that the cavity effects will be similar regardless of the type of laser materials used. (Author)
AD-667 118 Not available from CFSTI.

AN ANALYSIS OF THE GSFC LASER RANGING DATA.
Wolf Research and Development Corp., Bladensburg, Md. Applied Sciences Dept.
S. J. Moss, and W. T. Wells. 18 May 67, 72p
NASA-CR-93411
Contract NAS5-9756-58

Descriptors: *Lasers, *Satellite tracking, *Statistical analysis, *Tracking stations, Doppler effect, Explorer satellites, Geodetic satellites, Tracking networks.

For abstract, see STAR 06 09.
N68-18507 HC$3.00 MF$0.65

LIGHT- INDUCED MODULATION OF ABSORPTION (LIMA) IN CADMIUM SULFIDE.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
For primary bibliographic entry see Field 20L.
For abstract, see STAR 06 09.
N68-18772 HC$3.00 MF$0.65

STABILIZED CO2 GAS LASER QUARTERLY REPORT, 1 JUN. - 1 SEP. 1967.
Sylvania Electric Products, Inc., Mountain View, Calif. Western Div.
1 Sep 67, 34p NASA-CR-93546, QR-3
Contract NAS5-10309

Descriptors: *Frequency stability, *Gas lasers, *Laser outputs, Amplifiers, Carbon dioxide, Cooling, Excitation, Heat transfer, Laser modes, Optical heterodyning, Stable oscillations.

For abstract, see STAR 06 09.
N68-18946 HC$3.00 MF$0.65

THE ANALYSIS OF TURBULENCE FROM DATA OBTAINED WITH A LASER VELOCIMETER.
National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
W. J. Tomme, and N. E. Welch. 5 Feb 68, 32p
NASA-TM-X-53703

Descriptors: *Laser modes, *Pipe flow, *Turbulent flow, *Velocity distribution, Data processing, Laser outputs, Lasers, Pipes (tubes), Probability distribution functions, Statistical distributions.

For abstract, see STAR 06 09.
N68-19078 HC$3.00 MF$0.65

PHOTON-COUPLED ISOLATION SWITCH QUARTERLY REPORT, 1 JUL. - 30 SEP. 1967.

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. Texas Instruments, Inc., Dallas.
E. L. Bonin, and E. E. Harp. 30 Sep 67, 20p
NASA-CR-93668, TI-03-68-14
Contracts NAS7-100, JPL-951340
Prep- Prepared for Jpl

Descriptors: *Gallium arsenide lasers, *Phototransistors, *Semiconductor devices, *Switches, Isolators, Optical equipment, Silicon transistors, Systems engineering.

For abstract, see STAR 06 09.
N68-19395 HC$3.00 MF$0.65

PRODUCING HOLOGRAMS OF REACTING SPRAYS IN LIQUID PROPELLANT ROCKET ENGINES, PHASE 1 INTERIM REPORT, 1 AUG. 1967 - 7 FEB. 1968.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. TRW Systems, Redondo Beach, Calif.
For primary bibliographic entry see Field 21H.
For abstract, see STAR 06 09.
N68-19439 HC$3.00 MF$0.65

20F. Optics

CHEMILUMINESCENT MATERIALS.
American Cyanamid Co., Stamford, Conn. Central Research Div.
For primary bibliographic entry see Field 7D.
AD-460 413 HC$3.00

SPATIAL FREQUENCY FILTERING.
Michigan Univ., Ann Arbor. Inst. of Science and Technology.
For primary bibliographic entry see Field 17E.
AD-480 352 HC$3.00 MF$0.65

BIBLIOGRAPHY OF AFCRL PUBLICATIONS FROM 1 JULY 1966 TO 30 SEPTEMBER 1967.
Air Force Cambridge Research Labs L G Hanscom Field Mass
For primary bibliographic entry see Field 5B.
AD-666 664 HC$3.00 MF$0.65

INVESTIGATION OF THE LIGHT SCATTERING TECHNIQUE FOR COUNTING AND SIZE DETERMINATION OF MICRON-SIZED METEORITES.
Northeastern Univ Boston Mass
For primary bibliographic entry see Field 3C.
AD-666 703 HC$3.00 MF$0.65

WIDTH OF CARBON RESONANCE LINES AND IDENTIFICATION OF BANDS IN RADIATION FROM CARBON RESONANCE LAMP.
Technical rept. Mar-Nov 67,
Aerospace Corp El Segundo Calif Lab Operations
A. Greenville Whittaker, and Paul Kintner. Dec 67, 15p Rept no. TR-0158 (3250-40)-2
SAMSO-TR-68-87
Contract F04695-67-C-0158

Descriptors: (*Carbon arc lamps, Spectroscopy), Carbon, Line spectrum, Carbon monoxide, Band spectrum.
Identifiers: *Carbon resonance lamps.

The emission bands that occur in the radiation from a carbon resonance lamp in the spectral range from 1650 to 1900A were identified as part of the CO 4th positive system. A brief study was made of the source of CO and its effect on the emission. It was found that the CO may come from the reaction of graphite with oxygen introduced as an impurity in the filler gas or from oxygen or CO contained in inadequately degased graphite cathode. Large concentrations of CO cause some decrease in radiation intensity. The carbon resonance 'line' at 1657A was also studied. There was little or no line broadening due to self absorption, and the line width of all the components of the resonance 'line' was < 0.075A. (Author)
AD-666 705 HC$3.00 MF$0.65

LENINGRAD UNIVERSITY. HERALD, VOL. 19, NO. 22, PHYSICS AND CHEMISTRY SERIES, No 0. 4, 1964.
Foreign Technology Div Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 20H.
AD-666 727 HC$3.00 MF$0.65

INFRARED COATING STUDIES.
Quarterly rept. no. 7, 15 Dec 67-15 Mar 68.
Bausch and Lomb Inc Rochester N Y Research and Development Div
15 Mar 68, 27p
Contract DA-44-009-AMC-1707 (E)
See also AD-664 786.

Descriptors: (*Infrared filters, *Optical coatings), Films, Band-pass filters, Reflectivity, Vapor plating, Absorption, Calcium compounds, Lead compounds, Molybdates, Tungstates, Heating, Ultrasonic radiation.
Identifiers: Reststrahlen, Sodium-potassium-niobate.

Contents: Evaporated molybdates and tungstates for the near infrared; Co-evaporated PbMoO4-BaF2 films; Reststrahlen in sodium-potassium-niobate; ThF4 films.
AD-666 787 HC$3.00 MF$0.65

SMITH-PURCELL RADIATION FROM A NARROW TAPE HELIX.
Revised ed.,
Illinois Univ Urbana
A. R. Neureuther, and R. Mittra. 28 Aug 67, 13p
AROD-5405:11
Grant DA-ARO (D)-31-124-G646
Revision of report dated 1 May 67.
Availability: Published in Proceedings of the IEEE, v55 n12 p2134-42 1967.

Descriptors: (*Electromagnetic waves, Helixes), Electron beams, Theory, Frequency, Light, Boundary value problems, Surface properties, Velocity, Harmonic analysis, Synchronization (Electronics).
Identifiers: Smith-Purcell radiation.

A theoretical investigation of a narrow tape helix excited by a modulated electron beam gives quantitative results which can be used to estimate the strengths of interactions obtainable in experimental configurations. Extensive results are presented for the radiation emitted by a single fast space harmonic when a slow beam is in synchronism with the azimuthally symmetric space harmonic. The effects of beam velocity, frequency, beam diameter, tape width, and pitch angle are illustrated. The analysis also demonstrates the influence of the synchronism or electromagnetic resonance condition on the interaction and, further, points out the usefulness of the complex Brillouin (k-beta) diagram in predicting some of the quantitative as well as most of the qualitative properties of this influence. (Author)
AD-666 866 Not available from CFSTI.

COMPARISON BETWEEN EXPERIMENTAL AND CALCULATED SPECTRA OF CARBON DIOXIDE AND WATER VAPOR,
Denver Univ Colo Dept of Physics
For primary bibliographic entry see Field 7D.
AD-666 929 HC$3.00 MF$0.65

STUDY AND DEVELOPMENT OF A SIMULATION INFINITE DEPTH OF FIELD OPTICAL PICKUP.
Final rept. 15 Jul 66-15 Sep 67,
Goodyear Aerospace Corp Akron Ohio
James A. Horton, and John F. Bartucci. Nov 67, 66p Rept no. GER-12832S/14
AMRL-TR-67-197
Contract AF 33 (615)-5365

Descriptors: (*Camera lenses, Resolution), Flight simulators, Design, Training, Vidicons, Illumination, Diffraction, Distortion, Simulation, Focusing.
Identifiers: Schiempflug condition, Depth of field.

Sufficient depth of field is an inherent problem in all conventional optical pickup designs. The solution in the past has been to operate at higher f-numbers and accept the increased object-lighting requirements. In Phase I of this program, several techniques were investigated that utilized the Schiempflug condition to increase the depth of the field without affecting the f-number of the pickup. Of these techniques, one proving especially useful involved the tilting of the final imaging lens about its rear nodal point to compensate for the final image tilt. (Author)
AD-666 939 HC$3.00 MF$0.65

THEORETICAL PREDICTION OF THE STIMULATED THERMAL RAYLEIGH SCATTERING IN LIQUIDS,
Pennsylvania State Univ University Park Dept of Physics
R. M. Herman, and M. A. Gray. 9 Oct 67, 6p
Contract N00014-67-A-0385-001
Availability: Published in Physical Review Letters, v19 n15 p824-8 9 Oct 1967.

Descriptors: (*Rayleigh scattering, Liquids), Mathematical prediction, Heat transfer, Thermodynamics, Backscattering, Lasers, Coherent radiation, Excitation, Atomic energy levels.
Identifiers: Nonlinear optics, Threshold.

The present letter, discusses a different kind of direct coupling between the light and thermal fields which is strong enough to allow the existence of the stimulated Rayleigh effect in back-scattering, provided that certain easily satisfied conditions are met. The mechanism which is proposed is the production of thermal energy following light absorption through electronic transitions in liquids (e.g., colored solutions) which absorb laser light.
AD-666 952 Not available from CFSTI.

SATURATION EFFECTS IN STIMULATED RAYLEIGH-WING SCATTERING,
Pennsylvania State Univ University Park Dept of Physics
R. M. Herman. 1967, 8p
Contract N0014-67-A-0385-0001
Availability: Published in The Physical Review, v164 n1 p200-6 Dec 5 1967.

Descriptors: (*Rayleigh scattering, Liquids), Polarization, Lasers, Coherent radiation, Refractive index.
Identifiers: Nonlinear optics.

The phenomenon of stimulated Rayleigh-wing scattering in anisotropic molecular liquids is analyzed. Representative combinations of polarization for the incident and scattered light are considered. It is shown that in regions where the focused laser beam is intense, saturation occurs in the molecular response to external optical fields, in that perfect alignment of the individual liquid molecules in the optical fields is approached. Accordingly, the nonlinear amplification associated with the stimulated radiation is reduced. The results of the analysis qualitatively explain several important recent observations which are in conflict with previous theoretical predictions. For example, it is shown that the nonlinear gain is considerably greater than the incident light is circularly polarized (the stimulated radiation being circularly polarized in the reverse sense) than it is when the incident light is linearly polarized. Despite saturation, sufficient amplification exists in the former case to allow the efficient conversion of incident to stimulated Rayleigh light at moderate power levels. (Author)
AD-666 954 Not available from CFSTI.

AN ELECTRON MICROSCOPE LIQUID HELIUM STAGE FOR USE WITH ACCESSORIES.
Revised ed.,
Sussex Univ Brighton (England) School of Mathematical and Physical Sciences
J. A. Venables, D. J. Ball, and G. J. Thomas. 16 Oct 67, 7p
AFOSR-68-0538
Grant AF-EOAR-61-65
Revision of report dated 18 Apr 67.
Availability: Published in Journal of Scientific Instruments (Journal of Physics E) Ser2 v1 p121-6 1968.

Descriptors: (*Electron microscopes, Design), Liquefied gases, Helium, Low-temperature research, Cryostats, Vacuum, Performance (Engineering), Stability, Contamination, Protection.
Identifiers: Helium stage.

A stage for an electron microscope has been constructed which is stable and versatile. It is a two-axis tilting stage which will operate at temperatures between liquid helium temperature and 50C. A surrounding shield at 80K provides contamination protection. The specimen exchange mechanism is retained. An integral feature of the design is the provision for accessories which can be used without modification to the stage and without breaking the microscope vacuum. The stage and its performance are described. Two accessories in present use, an ion gun and a device used for studying condensed gases, are also described, and some results are shown. (Author)
AD-667 043 Not available from CFSTI.

NEW TECHNIQUE FOR HIGH MAGNIFICATION CALIBRATION OF AN ELECTRON MICROSCOPE,
Army Electronics Command Fort Monmouth N J Inst for Exploratory Research
Charles F. Cook, Jr. Oct 67, 3p
Availability: Published in The Review of Scientific Instruments, v38 n10 p1430-2 1967.

Descriptors: (*Electron microscopes, Calibration), Intensity, Ferrites, Single crystals, Etched crystals, Accuracy, Standards, Photomicrography, Surface properties.

The surface of a single crystal having etch steps of known heights can be used for magnification calibration. The etched basal surface of a hexagonal ferrite single crystal has etch steps whose heights are a precisely known function of its unit cell height. Depending upon the mixed-layer stacking arrangement of the hexagonal ferrite phase such etch steps can have heights ranging in increments from 11.6 to 300A. After careful selection of a characterized hexagonal ferrite single crystal, it is etched in 1:1 HCl at 90C until etch features are visible on the basal surface. The crystal is replicated by the one step method. The angle used for shadowing (from 1:1 to 3:1) must be accurately set since any error in the shadow angle will produce a corresponding error in the magnification. The shadow cast by the etch steps on the replica is viewed in the electron microscope is then used as the standard for calibration of magnifications in excess of 10,000 times. (Author)
AD-667 115 Not available from CFSTI.

TIME-VARYING REFLECTION FROM ROTATING CONVEX SURFACES,
Mitre Corp Bedford Mass
Dean O. Carhoun. Mar 68, 10p Rept no. MTP-45
ESD-TR-68-124
Contract AF 19 (628)-5165
Availability: Published in Journal of the Optical Society of America, v58 n1 p41-7 Jan 1968.

Descriptors: (*Satellites (Artificial), Reflection), (*Conical bodies, Reflection), Illumination, Rotation, Light, Theory, Integral equations, Tensor analysis, Matrix algebra, Partial differential equations, Euler's angles.
Identifiers: Photometry.

A method is presented for determining the time variation of the photometric flux density received in the far field by diffuse Lambert reflection from the surfaces of rotating objects of different shapes. The surfaces discussed are restricted to the class of convex quadric surfaces which can be identified with coordinate surfaces of systems of orthogonal, curvilinear coordinates in euclidean 3-space. The relative motion between the object and observer, and object and source is described by rotation with three degrees of freedom. Formulas permitting calculation of the received flux density by routine substitution are presented. The results for some of the more general quadric surfaces can be obtained by simple extension of the results for conical surfaces. (Author)
AD-667 123 Not available from CFSTI.

POLARIZATION PROPERTIES OF A SIMPLE DIELECTRIC ROUGH-SURFACE MODEL,
Grumman Aircraft Engineering Corp Bethpage N Y Research Dept
G. C. McCoyd. Jan 68, 8p Rept no. RE-315J
Availability: Published in Journal of the Optical Society of America, v57 n11 p1345-50 Nov 1967.

Descriptors: (*Albedo (Astronomy), Surface roughness), (*Light, Polarization), Reflection, Refractive index, Light transmission, Dielectrics, Moon, Interfaces, Scattering.
Identifiers: Computer analysis.

The percent polarization of light reflected from a rough surface has been calculated using a two-dimensional, two-layer, dielectric model and the geometrical-optics approximation. The choice of this model was prompted by a desire to investigate the dependence of the percent polarization upon internal scattering and re-emission of light which has penetrated the top surface. The parameters of the model are the indices of refraction of the two layers, and the distribution of slopes of the top surface to the top surface of the upper layer. Polarization curves that are qualitatively similar to lunar and laboratory-sample signatures (i.e., the percent polarization is negative at small phase angles and positive at larger phase angles) can be obtained with this model. The curves are very sensitive to changes of the distribution of slopes or the index of refraction of the upper layer, but not, for the cases considered, to changes of the index of refraction of the lower layer. For the range of parameters considered in this paper, a variation of the index of refraction of the upper layer produces a change of the albedo; the sign of the change is opposite to that of the change of the percent polarization at high phase angles (about 90 degrees). However, a variation of the structure (distribution of slopes) of the top surface produces changes of the albedo and percent polarization of the same sign. (Author)
AD-667 158 Not available from CFSTI.

COLORIMETRY,
National Bureau of Standards, Washington, D. C. Inst. for Basic Standards.
I. Nimeroff. Jan 68, 52p
NBS Circular-478-Superseded. Hard copy available from Superintendent of Documents, GPO, Washington, D. C. $0.35 as C13.44.104.

Descriptors: (*Colors, Analysis), Spectra (Visible + ultraviolet), Light, Visual perception, Pigments, Dyes, Surface properties, Spectrum analyzers, Reflection, Refraction, Optics, Photometers, Light transmission, Photoelectric materials.
Identifiers: Colorimetry, Color scales, Grading systems (Colors).

The definition of color, as a characteristic of light, and the basic principles of its measurement are given. The reduction of spectrophotometric data to three chromaticity coordinates by means of the three-function CIE standard observer system for colorimetry is described. Various methods of direct colorimetry, and visual and photoelectric methods of colorimetry by differences from material standards are treated. The most useful collections of material color standards are described and the most widely used one-dimensional color scales are explained. The limitations of several colorimetric methods: spectrophotometric, photoelectric, and visual, are discussed. (Author)
NBS-Mono-104 HC$0.35 MF$0.65

LUNAR LANDER MASS SPECTROMETER FINAL REPORT.
Gca Technology Div., Gca Corp., Bedford, Mass.
R. F. Herzog, and W. P. Poschenrieder. Mar 67, 22p NASA-CR-93545, GCA-TR-67-6-N
Contract NAS5-9393

Descriptors: *Ion sources, *Lunar landing modules, *Mass spectrometers, *Sputtering, Duoplasmatrons, Lunar composition, Lunar exploration, Lunar topography, Systems engineering.

For abstract, see STAR 06 09.
N68-18947 HC$3.00 MF$0.65

20G. Particle Accelerators

FOREIGN SCIENCE BULLETIN, VOL. 4, NO. 3, 1968.
Library of Congress Washington D C Aerospace Technology Div
Mar 68, 123p
A monthly review of selected foreign scientific and technical literature. Also available on subscription, $18.00/year, $22/50/year foreign. See also Report for February 1968, AD-666 158.

Descriptors: (*Particle accelerators, Design), (*Lasers, Optical equipment), (*Satellites (Artificial), USSR), Computers, Cybernetics, Atmospherics, Moon, Earthquakes, Electrotherapy, Space medicine, Geophysics, Underwater vehicles, Meteorological parameters, Radioactive fallout, Scientific personnel, Reviews, Plasma medium, Waveguides, Measurement.
Identifiers: Ponderomotive method.

Contents: Papers: Plasma waveguides for accelerators; Measurement of laser output; Kosmos Satellites, 1967. Surveys: Automation of computer design; Algorithmic languages and translating systems; Cybernetics in Uzbekistan; Development of mechanics in Uzbekistan; Structure, functions, and activities of the Hungarian Academy of Sciences. Notes: Calculation of waveforms of atmospherics; An automatic color-recognition system; Electromechanical digital actuator; Measurement of lunar surface density and hardness by Luna-13; Forerunner of a strong tectonic earthquake; The use of exponential pulse currents for electrotherapy of pain syndromes; The Union Scientific-Research Institute of Instrument Manufacture. Conferences: Soviet contributions in the life sciences presented at the XVIII Congress of the International Astronautical Federation; Biological rhythms and the development of work-rest regimes for cosmonauts; All-union symposium on problems of turbulent flow and its geophysical applications; Conference on deep sea research vehicles; conference on dynamics of clouds, fogs, and precipitation; Lasers in medicine; Cooperation between Soviet science and industry. Personalities: Konstantin Borisovich Karandeyev. Book reviews: Gamma radiation of radioactive fallout.
AD-666 875 HC$3.00 MF$0.65

ACTIVATION ANALYSIS: COCKCROFT-WALTON GENERATOR, NUCLEAR REACTOR, LINAC, JULY 1966-JUNE 1967,
National Bureau of Standards, Washington, D. C. Activation Analysis Section.
For primary bibliographic entry see Field 7E.
NBS-TN-428 HC$0.55 MF$0.65

20H. Particle Physics

SYNTHESIS OF DIATOMIC RADICALS.
National Bureau of Standards, Washington, D. C.
For primary bibliographic entry see Field 7D.
AD-430 393 HC$3.00

DISPERSION RELATIONS IN HIGH ENERGY PHYSICS.
Final rept. 1 Nov 64-30 Sep 67,
University Coll London (England) Dept of Physics
Harrie Massey. 31 Oct 67, 16p
AFOSR-68-0519
Grant AF-EOAR-62-64

Descriptors: (*Nuclear reactions, *Dispersion relations), Pions, Nucleons, Nuclear scattering, Photonuclear reactions, K mesons, Great Britain.
Identifiers: Photoproduction, Symmetry (Quantum mechanics).

A phase shift analysis of pion-nucleon scattering up to 1.5 GeV was made which revealed a quantity of resonance structure. Low energy pion photoproduction is now almost completely understood in terms of pion-nucleon scattering. Strange-particle coupling constants were evaluated and shown to be consistent with pseudo-scaler SU (3). Several mathematical contributions to the study of dispersion relations were made. (Author)
AD-666 680 HC$3.00 MF$0.65

LENINGRAD UNIVERSITY. HERALD, VOL. 19, NO. 22, PHYSICS AND CHEMISTRY SERIES, No O. 4, 1964.
Foreign Technology Div Wright-Patterson AFB Ohio
9 May 67, 236p Rept no. FTD-MT-64-358
Edited machine trans. of Leningrad Univ. Vestnik (USSR) v19 n22, Seriya Fiziki i Khimii, n4 p5-167 1964.

Descriptors: (*Physics, USSR), (*Chemistry, USSR), Elementary particles, Nuclear structure, Nuclear cross sections, Nuclear resonance, Antimony, Radioactive decay, Acrylic resins, Aluminum alloys, Solar spectrum, Upper atmosphere, Polymerization, Phase studies, Copper compounds, Germanium, Solid solutions, Complex compounds, Corrosion, Spectroscopy, Ion exchange resins, Sulfuric acid, Phosphoric acids, Rheology.

Contents: Equations for vertex parts and bound states; Associating of nucleons in nuclei; Near-threshold behavior of the inelastic-scattering cross section; Nuclear-resonance generator with flowing liquid; Radiation of Sb125; Dependence of angles of orientation in dynamic double refraction on the velocity gradient; Determination of hydrogen in aluminum alloys by the method of isotopic balancing; On the 'Mean time of the free path' of O2 molecules; Approximation of isolated line during transfer of radiative energy in the upper atmosphere; On polyanions in solutions; Question about phase transitions in solid bodies; Electrokinetic properties of deposits of copper ferrocyanide obtained in different conditions; Separating and identifying reaction products of deep splitting of germanium by fast protons; Thermodynamic investigation of solid solutions in a NaCl - KCl - CdCl2 system at temperatures of 540, 580, 623C; Amperometric titrating certain cations by Trilon B with revolving microplatinum electrodes; Oxidation rate of copper during brief heating to high temperatures; Spectrophotometric investigation of ascorbinate complexes; Reducing properties of ionites; Infrared absorption spectra of anhydrous sulfuric and orthophosphoric acids.
AD-666 727 HC$3.00 MF$0.65

MECHANISMS OF ENERGY TRANSFER IN DIELECTRICS.
New York Univ N Y Radiation and Solid State Lab
For primary bibliographic entry see Field 20C.
AD-666 775 HC$3.00 MF$0.65

(Li7,p), (Li7,d), AND (Li7,t) REACTIONS ON C12 NEAR 3.5 MeV,
Minnesota Univ Minneapolis School of Physics and Astronomy
James F. Morgan, and Russell K. Hobbie. 20 Nov 67, 3p
Research supported in part by NONR.
Availability: Published in The Physical Review, v163 n4 p992-4 20 Nov 67.

Descriptors: (*Carbon, *Ion bombardment), (*Lithium, Nuclear reactions), Protons, Deuterons, Tritons, Differential cross section, Nuclear energy levels, Oxygen, Alpha particles.

The reactions C12 (Li7,p0)O18, C12 (Li7,p1)O18, C12 (Li7,d1)O17, and C12 (Li7,t0)O16 were studied at laboratory energies of 3.3, 3.5, and 3.7 MeV. The reactions appear to proceed mainly through the compound nucleus. (Author)
AD-666 849 Not available from CFSTI.

DELAYED ALPHA EMISSION FROM Na20.
California Univ Los Angeles
R. M. Polichar, J. E. Steigerwalt, J. W. Sunier, and J. Reginald Richardson. 27 Jul 67, 7p
Contract Nonr-233 (44)
Revision of report dated 22 May 67.
Availability: Published in Physical Review, v163 n4 p1084-90 Nov 1967.

Descriptors: (*Sodium, *Beta decay), (*Alpha spectra, Sodium), Nuclear energy levels, Proton bombardment, Isomeric transitions, Recoil atoms, Emissivity.
Identifiers: Alpha emission.

The beta decay of Na20 proceeding to highly excited states of Ne20 was studied by measuring the delayed alpha particles which are subsequently emitted. Na20 was produced by a (p, alpha n) reaction on a natural magnesium target, in an external beam of 45-MeV protons from the UCLA cyclotron. A thin silicon detector and nanosecond electronics were used to suppress the large positron background usually present in this type of experiment. A method of measuring Q-alpha directly is discussed. Alpha transitions from states in Ne20 at 7.43, 7.84, 8.74, 9.48, 10.28, 10.86, and 11.28 MeV were observed and their intensities measured. (Author)
AD-666 851 Not available from CFSTI.

PRODUCTION OF PROTONS, DEUTERONS, AND TRITONS FROM Li6 ON Li7 AT 3.5 MeV,
Minnesota Univ Minneapolis School of Physics and Astronomy
Douglas S. Gale, and J. M. Blair. 1967, 3p
Research supported in part by ONR.
Availability: Published in Physical Review v161 n4 p1061-3 Sep 20 1967.

Descriptors: (*Lithium, *Ion bombardment), Protons, Deuterons, Tritons, Boron, Nuclear cross sections, Distribution.

Angular distributions of four groups of protons, four groups of deuterons, and one group of tritons were obtained from the bombardment of Li7 on Li6 at an incident energy of 3.50 MeV. The observed distributions differ appreciably from earlier observations at 2.1 Me uthor)
AD-666 855 Not available from CFSTI.

BREAKING CHIRAL SYMMETRY,
Harvard Univ Cambridge Mass Dept of Physics
S. L. Glashow, and Steven Weinberg. 1968, 4p
Contract Nonr-1866 (55)
Prepared in cooperation with Massachusetts Inst. of Tech., Cambridge. Lab. for Nuclear Science, Contract AT (30-1)-2098.
Availability: Published in Physical Review Letters, v20 n5 p224-7 Jan 29 1968.

Descriptors: (*Mesons, *Groups (Mathematics)), Pions, K mesons, Invariance, Operators (Mathematics).
Identifiers: *Symmetry (Quantum mechanics), Eta mesons, Kappa mesons.

The note explores what can be learned about chiral-symmetry breaking under two assumptions: (1) The Lagrangian is invariant under the product of SU (3) and SU (3) except for a term which transforms under the representation the sum of (3,3*) and (3*,3), and (2) certain vertex functions are as smooth as possible. No assumption is made concerning the magnitude of the symmetry-breaking term. The natural appearance of a pseudoscalar nonet pi, K, ETA, and ETA*, and of a scalar kaon kappa lying below or just above the K-pi threshold. A refinement is obtained of the Ademollo-Gatto theorem for the Ke3 form-factor f (+) (0).
AD-666 859 Not available from CFSTI.

ATOMIC-SHELL STRUCTURE IN INELASTIC COLLISIONS,
Pittsburgh Univ Pa Dept of Physics
For primary bibliographic entry see Field 7D.
AD-666 877 Not available from CFSTI.

NUCLEAR SPIN RELAXATION IN CS AND RB METALS BELOW 77 DEGREES K,
Cornell Univ Ithaca N Y Lab of Atomic and Solid State Physics
G. P. Carver, D. F. Holcomb, and J. A. Kaeck.
26 Jun 67, 6p
AROD-6028:2-P
Contract DA-31-124-ARO (D)-407
Availability: Published in The Physical Review, v164 n2 p410-2 Dec 10 1967.

Descriptors: (*Alkali metals, *Nuclear spins), (*Nuclear magnetic resonance, Alkali metals), Cesium, Rubidium, Cryogenics, Anomalies, Relaxation time, Crystal lattices.
Identifiers: Spin-lattice relaxation, Spin echoes.

Experimental values of the product (T sub 1)T have been determined in the low-temperature range for the nuclear spin systems Cs133 and Rb87 in Cs and Rb metals. Anomalous results previously reported for Cs at low temperatures have been shown to arise from thermal gradients in experimental samples and are spurious. The experimental values which obtain from 1.4 to 77 degrees K are (T sub 1)T = 0.13 plus or minus 0.01 sec degree K for Cs133 and (T sub 1)T = 0.11 plus or minus 0.01 sec degree K for Rb 87. Spin-echo measurements of the intrinsic T2 for Cs133 in our samples give T2 = 1.5 msec. This number agrees with determination of intrinsic linewidths by others by independent techniques. (Author)
AD-666 879 Not available from CFSTI.

THE NEW RADIOSOTOPE 99Ag AND SOME MEASUREMENTS ON 100Ag,
California Univ Los Angeles
For primary bibliographic entry see Field 18B.
AD-666 886 Not available from CFSTI.

CLASSICAL APPROXIMATION FOR IONIZATION BY PROTON IMPACT,
Pittsburgh Univ Pa Dept of Physics
For primary bibliographic entry see Field 7D.
AD-666 889 Not available from CFSTI.

BOUNDARY EFFECTS ON THE ENERGY LOSS OF CHARGED PARTICLES,
Rand Corp Santa Monica Calif
Edward A. Stern. 4 Apr 61, 57p Rept no. P-2270

Descriptors: (*Charged particles, Interactions), (*Cerenkov radiation, Charged particles), Dielectrics, Transport properties, Emissivity, Plasma oscillations, Energy, Electrons, Photons.

The energy loss of a charged particle moving at a constant velocity and passing normally through

the boundary between two dielectric media is calculated. Attention is focused on the effects of the boundary and it is shown that the boundary creates two new mechanisms for losing energy. These are transition radiation and surface plasma oscillations. In addition, there are boundary corrections to the losses that are suffered by the particle in passing through the bulk material which are only important if the path length in the medium is of the order of the wavelength associated with the energy loss. The initiation of the emission of Cerenkov radiation as the particle first enters a medium is also studied in detail. (Author)
AD-666 943 HC$3.00 MF$0.65

WEAPONS RADIATION SHIELDING HANDBOOK. CHAPTER 3. METHODS FOR CALCULATING NEUTRON AND GAMMA-RAY ATTENUATION,
Oak Ridge National Lab Tenn
For primary bibliographic entry see Field 18H.
AD-666 973 HC$3.00 MF$0.65

THE FORM FACTOR OF THE NEUTRAL PION,
Columbia Univ Irvington-on-Hudson N Y Nevis Labs
Peter Nemethy. 1968, 74p Rept nos. R-617, NEVIS-165
Contract Nonr-266 (72)

Descriptors: (*Pions, *Decay schemes), Meson reactions, Gamma emission, Pair production, Invariance, Dispersion relations, Internal conversion.
Identifiers: Form factors.

In an experiment performed at Columbia University's Nevis Cyclotron, the decay 'neutral-pion to gamma photon + electron + positron' was observed. Using a system of counters and spark chambers 2200 events were recorded with an opening angle of the Dalitz pair near 120 deg. The effect of pi-zero structure on the invariant mass spectrum of the pair is interpreted as an electromagnetic form factor for the neutral-pion. The form factor is a linear function, (gamma) (x) = 1 + ax, of the invariant mass squared, x. The experimental result for the form factor slope is a = (+0.01 plus or minus 0.11) (1/ (pion mass)sq.).
AD-666 979 HC$3.00 MF$0.65

AN EFFECTIVE NUCLEON-NUCLEON POTENTIAL FOR USE IN NUCLEAR HARTREE-FOCK CALCULATIONS.
Carnegie-Mellon Univ Pittsburgh Pa Dept of Physics
C. W. Nestor, Jr., K. T. Davies, S. J. Krieger, and M. Baranger. Mar 68, 31p Rept no. TR-30
Contract Nonr-760 (15)
Availability: To be pub. in Nuclear Physics, 31p n.d.

Descriptors: (*Nuclear structure, *Hartree-Fock approximation), Nucleons, Interactions, Potential energy, Potential scattering, Perturbation theory, Nuclear binding energy, Deuterons, Nuclear energy levels, Neutron scattering.

An effective nucleon-nucleon potential for use in nuclear Hartree-Fock calculations was constructed from a central potential, a velocity-dependent repulsive potential, and tensor and spin-orbit potentials. The principal aim of this work was to determine an effective potential having no 'hard-core' singularity, giving the correct energy and density of nuclear matter, and fitting the two-body scattering data as well as possible, consistent with good estimates of nuclear matter properties. An additional requirement was that the second-order contribution to the energy of nuclear matter be small, in order to improve the convergence of the perturbation expansion. The results include the parameters determining a family of potentials, the calculated two-body phase shifts, scattering lengths and effective ranges, the quadrupole moment and percentage of D state in the deuteron, and a calculated effective single-particle potential. (Author)
AD-666 994 Not available from CFSTI.

58Ni (p,p'Gamma)58Ni ANGULAR CORRELATION MEASUREMENTS.
Scientific Interim rept.,
Franklin Inst Swarthmore Pa Bartol Research Foundation
Roger N. Horoshko, Peter F. Hinrichsen, L. Wayne Swenson, and Douglas M. Van Patter. 20 Jul 67, 25p
AFOSR-68-0595
Grant AF-AFOSR-401-66
Research supported in part by NSF.
Availability: Published in Nuclear Physics, vA104 p113-35 1967.

Descriptors: (*Nickel, *Nuclear spins), (*Proton reactions, Nickel), Gamma emission, Decay schemes, Nuclear energy levels, Parity, Ground state, Isomeric transitions.

Angular correlation measurements in a 180 deg. geometry for the 58Ni (p,p'gamma) reaction were used to determine the spins and gamma-ray decay properties of states at 2.46, 2.78, 3.04 and 3.26 MeV. The 2.46 MeV state was verified to be spin J=4, and the states at 2.78, 3.04 and 3.26 MeV were assigned spin J=2. The (L+1)/L mixing ratio for the 2.78 to 1.46 MeV transition is delta = 1.5 + 1.5 or - 0.4, strongly suggestjng positive parity for this state. Using the available information for the ground state branching of this 2 (sub 2)+ state, the crossover to cascade ratio of the E2 transition rates is in disagreement by a factor of approx. 10,000 with the recent shell-model predictions of Cohen et al. For the 3.04 and the 3.26 MeV levels the mixing ratios delta for transitions to the 2 (sub 1)+ state are -0.1 plus or minus 0.15 and -0.4 plus or minus 0.2 with the corresponding branchings to the ground state off 38 plus or minus 2% and 64 plus or minus 2% respectively. (Author)
AD-667 004 Not available from CFSTI.

THE ONE PION EXCHANGE CONTRIBUTION TO THE WEAK PARITY VIOLATING NUCLEON-NUCLEON POTENTIAL.
Interim rept.,
Institute for Advanced Study Princeton N J
Bruce H. J. McKellar. 5 Mar 68, 3p
AFOSR-68-0569
Grant AF-AFOSR-1365-68
Availability: Published in Physics Letters, v26B n2 p107-8 25 Dec 67.

Descriptors: (*Nucleons, *Parity), (*Pions, Interactions), Potential theory, Decay schemes, Hyperons, Hamiltonian, Meson reactions.
Identifiers: *Pion exchange.

The one pion exchange contribution to the weak parity violating nucleon-nucleon potential is calculated by relating the weak N,N,pion vertex to the nonleptonic hyperon decays by the Suzuki-Sugarawa method. It is also shown that the G parity odd part of the weak Hamiltonian cannot contribute to the potential. (Author)
AD-667 006 Not available from CFSTI.

ON THE COMMUTATION RULES BETWEEN AXIAL CHARGES AND AXIAL DIVERGENCES,
Turin Univ (Italy) Inst of Theoretical Physics
For primary bibliographic entry see Field 20J.
AD-667 010 Not available from CFSTI.

SUPERCONVERGENCE SUM RULES IN NUCLEON-NUCLEON SCATTERING,
Turin Univ (Italy) Inst of Theoretical Physics
R. D'Auria, and V. de Alfaro. 1 Mar 67, 7p
AFOSR-68-0566
Grant AF-EOAR-29-66
Availability: Published in Nuovo Cimento, Ser10 v48A n1 p284-8 Mar 1 1967.

Descriptors: (*Nucleons, *Nuclear scattering), Antiparticles, Interactions, Operators (Mathematics), Regge poles, Italy.
Identifiers: *Superconvergence relations, Sum rules.

Consideration is given to the establishment of sum rules deriving from high-energy bounds in the nucleon-antinucleon channel. The problem of saturation is discussed.
AD-667 011 Not available from CFSTI.

INVESTIGATION OF EXCITED STATES OF P31 WITH THE Si30 (p, GAMMA)P31 REACTION,
Aerospace Research Labs Wright-Patterson AFB Ohio
Henry Willmes, and Gale I. Harris. 13 Apr 67, 13p Rept no. ARL-68-0009
Availability: Published in The Physical Review, v162 n4 p1027-35 Oct 20 1967.

Descriptors: (*Phosphorus, *Nuclear energy levels), (*Proton reactions, *Silicon), Gamma emission, Gamma-ray spectra, Decay schemes, Nuclear resonance, Parity, Isomeric transitions, Nuclear spins.

Some previously unknown properties of excited states of P31 were investigated by studying the gamma rays from the reaction Si30 (p, gamma)P31. A coincidence spectrum taken at the resonance proton energy Ep = 1177 keV reduced the maximum possible branching ratio of the decay of the 2.23-MeV level via the 1.27-MeV level to 0.8%. Spectra taken at the Ep = 1694-keV resonance yielded decay schemes for the unbound level at 8.93 MeV and the bound levels at 4.78, 5.12, and 5.66 MeV. Angular-correlation measurements at the same resonance led to the assignment of J-pi = 5/2 (+) to the 4.78-MeV level. Gamma-ray linear-polarization measurements at the resonances at Ep = 1204, 1322, 1509, and 2187 keV verified experimentally the even-parity assignments for the levels at 3.29, 3.41, 3.51, and 4.26 MeV and the virtual levels at 8.45 and 8.75 MeV. By comparison of the polarization results of earlier triple-correlation measurements, the unique values delta = 0.41 plus or minus 0.03 and delta = 0.32 plus or minus 0.04 were obtained for the M1-E2 mixing ratios of the 3.51 to 0 and 4.26 to 0 transitions, respectively. (Author)
AD-667 025 Not available from CFSTI.

SECOND 0 (+), T = 1 LEVEL IN 30P.
Journal article,
Aerospace Research Labs Wright-Patterson AFB Ohio
G. I. Harris, and A. K. Hyder, Jr. 21 Aug 67, 7p
ARL-68-0012
Availability: Published in Physics Letters, v25B n3 p210-2 21 Aug 67.

Descriptors: (*Phosphorus, *Nuclear energy levels), Proton reactions, Silicon, Gamma emission, Gamma-ray spectra, Decay schemes, Nuclear spins, Nuclear resonance.

Gamma-ray triple-correlation and polarization measurements at the J-pi = 1 (-) resonance at Ep = 1375 keV in 29Si (p,gamma)30P yield the unique assignment J-pi = 0 (+) for the recently discovered 4.468 MeV state in 30P. This state is identified as the T = 1 analog of the 3.786 MeV. J-pi = 0 (+) state in 30Si. (Author)
AD-667 026 Not available from CFSTI.

SUPERCONVERGENCE AND CURRENT ALGEBRA,
Turin Univ (Italy) Inst of Theoretical Physics
V. De Alfaro, S. Fubini, C. Rossetti, and G. Furlan. Sep 67, 36p
AFOSR-68-0564
Grant AF-EOAR-29-66
Prepared in cooperation with Trieste Univ. (Italy), Instituto di Fisica Teorica.
Availability: Published in Annals of Physics, v44 n2 p165-99 Sep 1967.

Descriptors: (*Elementary particles, Interactions), Decay schemes, Algebras, Operators (Mathematics), Regge poles, Invariance, Nuclear scattering, Italy.
Identifiers: *Current algebras, *Superconvergence relations, Sum rules.

Consideration is given to some general features of the superconvergence sum rules and of their saturation. A treatment is also given of the problem of the structure of current algebra sum rules, discussing the presence of non Regge asymptotic behavior. Finally, current algebra and superconvergence sum rules are discussed for higher-spin targets, and their mutual connections. (Author)
AD-667 044 Not available from CFSTI.

MASSES AND DECAY OF Al24, P28, Cl32, Sc40, AND THEIR Tz = O ANALOG STATES,
California Univ Los Angeles
Anthony J. Armini, Jules W. Sunier, and J. Reginald Richardson. Jan 68, 10p
Contract Nonr-233 (44)
Availability: Published in The Physical Review, v165 n4 p1194-202 Jan 20 1968.

Descriptors: (*Aluminum, *Radioactive decay), (*Phosphorus, Radioactive decay), (*Chlorine, Radioactive decay), (*Scandium, Radioactive decay), Proton reactions, Neutron reactions, Decay schemes, Half life, Beta-ray spectrum, Gamma-ray spectra, Nuclear energy levels, Selection rules, Nuclear isobars, Isomeric transitions.

The beta spectra and gamma transitions in the decay of Al24, P28, Cl32, and Sc40, produced by the (p,n) reaction in a sector-focused cyclotron, were measured with a wedge-gap magnetic spectrometer and a 3 cc lithium-drifted germanium detector. An on-line computer was used to separate, by half-life analysis, the activity of interest from longer-lived contaminants. The half-lives were measured to an accuracy of 0.5% and decay schemes are proposed. The ground-state masses are determined to 25-40 keV. In all cases, observation of a superallowed beta transition unambiguously determines the T=1, Tz=O analog state. The excitation energies of these analog states are measured to an accuracy of 3 keV. Mass relationships are used to predict from these data the excitation energy of the first T=2, Tz=O analog states. (Author)
AD-667 052 Not available from CFSTI.

THEORY OF SELF-INDUCED STRONG INTERACTIONS,
Yeshiva Univ New York Belfer Graduate School of Science
For primary bibliographic entry see Field 20J.
AD-667 063 Not available from CFSTI.

THE DETERMINATION OF THE STATIC QUADRUPOLE MOMENTS OF THE FIRST 2 (+) STATES IN 126Te AND 128Te BY COULOMB EXCITATION,
California Inst of Tech Pasadena
R. G. Stokstad, and I. Hall. 20 Mar 67, 16p
Contract Nonr-220 (47)
Availability: Published in Nuclear Physics, vA99 n3 p507-21 1967.

Descriptors: (*Tellurium, Quadrupole moments), (*Nuclear electric moments, Tellurium), Nuclear energy levels, Excitation, Ion bombardment, Helium, Oxygen, Nuclear cross sections, Perturbation theory.

Measurements of the probabilities for Coulomb excitation of the first 2 (+) states in 126Te and 128Te were made with 4He and 16O ions. The deviations observed from first-order perturbation theory are interpreted in terms of the static electric quadrupole moments Q2 of the first 2 (+) states of the two nuclei. The values of these static quadrupole moments in units of e.b are found to lie in the range $-0.16 > Q2 > -0.50$ for 126Te and $-0.01 > Q2 > -0.40$ for 128Te. (Author)
AD-667 071 Not available from CFSTI.

LOWEST TWO T = 3/2 STATES OF 17F OBSERVED IN THE 16O (p,p)16O REACTION,
California Inst of Tech Pasadena
J. R. Patterson, H. Winkler, and C. S. Zaidins. 20 Nov 67, 6p
Contract Nonr-220 (47)
Availability: Published in The Physical Review, v163 n4 p1051-5 20 Nov 67.

Descriptors: (*Fluorine, *Nuclear energy levels), Oxygen, Proton reactions, Nuclear spins, Selection rules, Elastic scattering, Anomalies, Carbon, Alpha particle reactions, Magnesium, Gamma emission, Nitrogen, Ion bombardment.

The lowest T=3/2 state of 17F was observed in the isospin-forbidden 16O (p,p)16O reaction, where anomalies have been found in the elastic channel and in the inelastic channels to the 6.13- and 7.12-MeV states of 16O. The partial width of this state as obtained from a phase-shift analysis of the elastic data is (40-20 (+10))eV. The excitation energies of both the lowest and the next higher T=3/2 states were determined by using the 12C (alpha, n)15O threshold and a 24Mg (alpha, gamma)28Si resonance as calibration points. Values of Ex=11.202 plus or minus 0.008 MeV (Ep=11.276 plus or minus MeV) and 12.554 plus or minus 0.008 MeV (Ep=12.714 plus or minus 0.008 MeV) were obtained, in agreement with the positions determined from the 15N (3He,n)17F reaction. The second T=3/2 state is well suited as an energy calibration point for accelerators. (Author)
AD-667 072 Not available from CFSTI.

NEW METHOD FOR MEASURING THE RATIO OF THE PROTON MAGNETIC MOMENT TO THE NUCLEAR MAGNETON,
California Inst of Tech Pasadena
J. B. Marion, and H. Winkler. 20 Apr 67, 4p
Contract Nonr-220 (47)
Availability: Published in The Physical Review, v156 n4 p1062-4 20 Apr 67.

Descriptors: (*Nuclear magnetic moments, Measurement), (*Protons, Nuclear magnetic moments), (*Proton reactions, Nuclear magnetic moments), Aluminum, Silicon, Lithium, Beryllium, Gamma-proton reactions, Neutron reactions, Nuclear resonance, Uncertainty.

Proton nuclear reaction energy measurements with magnetic and with time-of-flight beam analyzers can be combined to obtain a value for the proton magnetic moment, measured in nuclear magnetons. The value derived from experiments already performed is mu sub p/mu sub n = 2.79259 with a precision of plus or minus 44 ppm (without diamagnetic correction for protons in water). An increase in precision to plus or minus 20 ppm should be possible with equipment presently available. (Author)
AD-667 074 Not available from CFSTI.

A NUCLEAR STRUCTURE STUDY OF 23Na BY MEANS OF THE 22Ne (3He,d)23Na REACTION,
California Inst of Tech Pasadena
J. Dubois. 7 Aug 67, 21p
Contract Nonr-220 (47)
Availability: Published in Nuclear Physics, vA104 p657-76 1967.

Descriptors: (*Sodium, *Nuclear structure), Nuclear energy levels, Nuclear spins, Neon, Ion bombardment, Deuterons, Nuclear spectroscopy.

Energy levels between 2 and 9 MeV in 23Na were investigated by means of magnetic analysis of the deuterons from the 22Ne (3He,d)23Na reaction at 10 and 12 MeV bombarding energies. Angular distributions were measured and from optical-model analysis using DWBA, the angular momentum transferred by the stripped protons was determined. Spectroscopic factors were also obtained and compared with predictions of the Nilsson model. It was possible to fit all observed levels up to 5.5 MeV excitation energy into rotational bands when band mixing due to the rotational and particle motions was included for the levels with positive parity. A search for the lowest T = 3/2 levels was also performed. Furthermore, it is proposed that the 5.992 plus or minus 0.015 MeV level in 23Mg is the 3 (-)/2 hole state based on Nilsson orbit 2. (Author)
AD-667 079 Not available from CFSTI.

NUCLEOSYNTHESIS IN BIG AND LITTLE BANGS,
California Inst of Tech Pasadena
For primary bibliographic entry see Field 3B.
AD-667 080 Not available from CFSTI.

SOLAR NEUTRINOS,
California Inst of Tech Pasadena
For primary bibliographic entry see Field 3B.
AD-667 082 Not available from CFSTI.

RADIATIVE CORRECTIONS IN BETA DECAY,
Scientific interim rept.,
Harvard Univ Cambridge Mass Dept of Physics
Julian Schwinger. 18 Mar 68, 4p
AFOSR-68-0620
Contract AF 49 (638)-1380
Prepared in cooperation with State University of New York, Stony Brook, N. Y. Inst. for Theoretical Physics.
Availability: Published in Physical Review Letters, v19 n26 p1501-3 Dec 1967.

Descriptors: (*Beta decay, Interactions), Meson reactions, Photons, Groups (Mathematics), Field theory.
Identifiers: Form factors, Rho mesons.

The close connection between the beta-decay question and the problem of electromagnetic mass splittings, specifically that of the Rho meson is emphasized. The recognition of a form factor connecting the photon to the Rho meson, which makes the electromagnetic mass question meaningful, performs the same service for the correction to the beta-decay coupling.
AD-667 100 Not available from CFSTI.

THE RADIONUCLEIDE 101Ag,
California Univ Los Angeles
For primary bibliographic entry see Field 18B.
AD-667 108 Not available from CFSTI.

BOOTSTRAPLIKE CONDITIONS FROM SUPERCONVERGENCE,
Harvard Univ Cambridge Mass
M. Ademollo, H. R. Rubinstein, G. Veneziano, and M. A. Virasoro. 11 Oct 67, 5p
Contract Nonr-1866 (19)
Prepared in cooperation with Weizmann Institute of Science, Rehovoth, Israel.
Availability: Published in Physical Review Letters, v19 n24 p1402-5 11 December 1967.

Descriptors: (*Meson reactions, Particle trajectories), Decay schemes, Operators (Mathematics), Groups (Mathematics), Integral equations, Nuclear resonance, Strange particles.
Identifiers: *Superconvergence relations, Bootstrap hypothesis, Pseudoscalar mesons, Vector mesons, Regge trajectories, Symmetry (Quantum mechanics).

A study was made of the generalized superconvergent sum rules for a number of processes of the kind P + P to P + V, where P and V stand for pseudoscalar and vector mesons, respectively. Simple algebraic equations were found for the parameters of the leading Regge trajectories which are exchanged. The results are in good agreement with experiments. The limit of SU (3) symmetry is also considered. (Author)
AD-667 168 Not available from CFSTI.

DELAYED GAMMA RAYS FROM FISSION.
Technical rept. for 1 Aug 65-31 Jul 66,
General Dynamics, San Diego, Calif. General Atomic Div.
R. B. Walton, and R. E. Sund. Oct 66, 60p GA-7348
AFWL-TR-66-122
Contract AF 29 (601)-6837

Descriptors: (*Gamma rays, Fission), Neutron reactions, Uranium, Plutonium, Half life, Nuclear isomers, Emissivity, Detectors, Intensity.

Measurements of the energy spectrum of delayed gamma rays from the neutron fission of PU239 and U235 were performed with a nal detector at a number of time intervals between 2 and 80 microsec. The data showed three new prominent gamma rays with energies of 205, 390, and 1330 kev; two unresolved gamma rays having energies of approximately 110 kev; and the six gamma rays with energies of 260, 460, 720, 850, 910, and 1250 kev which were observed in previous studies for T > 50 microsec after fission. Absolute intensities of the new gamma rays were obtained using the normalization factor derived from the relative intensities of the last six gamma rays and their previously determined absolute intensities. (Author)
AD-801 007 HC$3.00 MF$0.65

INDUSTRIAL METHOD OF X-RAY FLUORESCENCE ANALYSIS OF HIGH-STRENGTH STEELS.
Army Tank-Automotive Center, Warren, Mich. Components Research and Development Labs.
For primary bibliographic entry see Field 7D.
AD-819 164 HC$3.00 MF$0.65

QUANTUM THEORY OF MANY PARTICLE SYSTEMS FINAL REPORT, 1 SEP. 1965 - 31 AUG. 1967.
Uppsala Univ. (Sweden). Quantum Chemistry Group.
31 Aug 67, 21p AFOSR-68-0100, AD-664073
Contract AF 61/052/-874

Descriptors: *Many body problem, *Perturbation theory, *Quantum mechanics, *Quantum theory, Atomic structure, Band structure of solids, Field theory (physics), Green function, Molecular structure, Symmetry.

For abstract, see STAR 06 09.
N68-18723 HC$3.00 MF$0.65

ENERGY LEVELS AND FILLING SEQUENCES.
Aztec School of Languages, Inc., Acton, Mass.
V. M. Klechkovskiy. Mar 68, 11p NASA-TT-F-11490
Contract NASW-1692
Tran- Transl. Into English From Zh. Eksperim. Teor. Fiz. (Moscow), V. 23, No. 1/7/, 1952 P 115-122

Descriptors: *Atomic energy levels, *Mathematical models, *Nuclear energy, *Quantum mechanics, Atomic excitations, Quantum numbers, Statistical mechanics, Theoretical physics.

For abstract, see STAR 06 09.
N68-18835 HC$3.00 MF$0.65

THE ANGULAR DISTRIBUTION OF SCATTERED AND SPUTTERED 40 KE V PARTICLES ON POLYCRYSTALLINE TARGETS.
Oesterreichische Studiengesellschaft Fuer Atomenergie G.M.B.H., Seibersdorf.
E. Formann, F. P. Viehboeck, and H. Wotke.
. 19p SGAE-PH-62/1967
Subm- Submitted for Publication

Descriptors: *Angular distribution, *Ion atom interactions, *Ion scattering, *Polycrystals, *Sputtering, Chemical analysis, Graphite, Ion beams, Neutron activation analysis, Radioactive isotopes, Scattering cross sections.

For abstract, see STAR 06 09.
N68-18858 HC$3.00 MF$0.65

DERIVATION OF NONRELATIVISTIC SUM RULES FROM CAUSALITY.
Laboratoire de Physique Theorique Et des Hautes Energies, Orsay (France).
K. Chadan, and A. Montes. Oct 67, 52p TH/219

Descriptors: *Elastic scattering, *Potential theory, *Scattering coefficients, Applications of mathematics, Differential equations, High energy interactions, Integral equations, Schroedinger equation, Sums, Theorem proving.

For abstract, see STAR 06 09.
N68-18970 HC$3.00 MF$0.65

ON SOME SINGULARITIES OF THE REGGE POLE MODEL AT MASS ZERO.
Laboratoire de Physique Theorique Et des Hautes Energies, Orsay (France).
R. Omnes. Nov 67, 9p TH/228

Descriptors: *Field theory (physics), *Mathematical models, *Regge poles, *Singularity (mathematics), Angular momentum, Expansion, High energy interactions, Mass distribution, Perturbation, Pions, Scattering cross sections.

For abstract, see STAR 06 09.
N68-18972 HC$3.00 MF$0.65

VARIATIONAL BOUNDS IN POSITRON ATOM SCATTERING.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
R. J. Drachman. Mar 68, 57p NASA-TM-X-63130, X-641-68-75

Descriptors: *Adiabatic equations, *Atomic collisions, *Correlation coefficients, *Elastic scattering, *Positrons, Annihilation reactions, Functions (mathematics), Helium, Hydrogen, Phase shift, Scattering cross sections.

For abstract, see STAR 06 09.
N68-19039 HC$3.00 MF$0.65

SOLAR SPIN DOWN AND NEUTRINO FLUXES.
National Aeronautics and Space Administration. Goddard Inst. for Space Studies, New York.
A. G. Cameron, and D. Ezer. Mar 68, 9p NASA-TM-X-60923

Descriptors: *Astronomical models, *Galactic evolution, *Neutrinos, *Solar flux, *Spin dynamics, Astrophysics, Cores, Theoretical physics.
For abstract, see STAR 06 09.
N68-19136 HC$3.00 MF$0.65

ON THE UPPER LIMIT OF ANTINUCLEI CONTENT IN COSMIC RAYS.
Volt Technical Corp., Washington, D. C.
YU. F.Gagarin, N. S. Ivanova, and V. N. Kulikov. 18 Mar 68, 7p NASA-CR-93476, ST-CR-NP-10688
Contract NAS5-12487
Tran- Transl. Into English From Kosmich. Issled. (Moscow), V. 6, No. 1, 1968 P 83-87

Descriptors: *Annihilation reactions, *Antiparticles, *Nuclear emulsions, *Primary cosmic rays, Nuclei (nuclear physics), Particle interactions, Scattering cross sections.

For abstract, see STAR 06 09.
N68-19358 HC$3.00 MF$0.65

SOME FEATURES OF NEUTRAL PION PRODUCTION IN INTERACTIONS OF 9 GE V NEGATIVE PIONS WITH XENON NUCLEI.
Niektore Wlasnosci Produkcji Neutralnych Pionow W Zderzeniach Ujemnych Mezonow Pion O Energii 9 Gev Z Jadrami Ksenonu
Polish Academy of Sciences, Warsaw. Inst. of Nuclear Research.
T. Siemiarczuk. 1967, 17p INR-844/VI/PH

Descriptors: *Particle production, *Pions, *Xenon, Bubble chambers, Emission spectra, Energy levels, Nuclei (nuclear physics), Particle interactions, Photons.

For abstract, see STAR 06 09.
N68-19375 HC$3.00 MF$0.65

ELASTIC SCATTERING OF SLOW ELECTRONS BY TWO-ELECTRON IONS.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
M. R. Mc Dowell. Feb 68, 29p NASA-TM-X-63137, X-641-68-60

Descriptors: *Elastic scattering, *Electron scattering, *Ions, Electron-ion recombination, Helium atoms, Lithium, Mathematical models, Numerical analysis, Polarization characteristics, Quadrupoles, Wave functions.

For abstract, see STAR 06 09.
N68-19386 HC$3.00 MF$0.65

ELECTRON IMPACT IONIZATION OH H/2S/ AND H/2P/.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
H. L. Kyle, and K. Omidvar. Mar 68, 35p NASA-TM-X-63143, X-641-68-90

Descriptors: *Asymptotic methods, *Born approximation, *Collision parameters, *Electron impact, *Energy levels, *Hydrogen atoms, *Ion impact, Bibliographies, Ion exchanging, Ionic collisions, Quantum numbers.

For abstract, see STAR 06 09.
N68-19436 HC$3.00 MF$0.65

A MEASUREMENT OF LONGITUDINAL PHOTON CONTRIBUTION IN PION ELECTROPRODUCTION FROM PROTONS,
Laboratoire de l'Accelerateur Lineaire, Universite de Paris, Orsay (France).
C. Betourne, C. Feautrier, J. Perez-Y-Jorba, and D. Treille. Dec 67, 28p LAL-1185

Descriptors: (*Pions, *Nuclear cross sections), Proton reactions, Electron bombardment, Gamma emission, Photons, Nucleons, France.
Identifiers: *Electroproduction.

A measurement of the pion electroproduction cross section from protons, at a transfer qsq = -3.4 (f to the -2 power) and a pi-N mass of sigma-L = 27.0 plus or minus 9.2 microbarns sigma-T = 81.8 plus or minus 4.3 microbarns sigma-L/sigma-T = .33 plus or minus .13. It is shown that this result is very sensitive to a correct application of radiative corrections but rather insensitive to the exact analytic expressions used. (Author)
PB-177 190 HC$3.00 MF$0.65

20I. Plasma Physics

SOME DIFFICULTIES IN THE THEORY OF MAGNETOGASDYNAMIC FLOWS INVOLVING UPSTREAM INFLUENCE EFFECTS.
Technical summary rept.,
Wisconsin Univ Madison Mathematics Research Center
G. W. Swan. Dec 67, 11p Rept no. MRC-TSR-765
Contract DA-31-124-ARO (D)-462

Descriptors: (*Magnetohydrodynamics, Shock waves), Fluid flow, Interactions, Boundary value problems.
Identifiers: Maxwell's equations.

In the mathematical analysis of certain types of magnetogasdynamic flow problems in which boundaries are present it is necessary to take account of the solution of the Maxwell equations in the boundary regions. Some authors have neglected to consider this solution, and this article comments on some of the formulations which are defective in this respect. (Author)
AD-666 605 HC$3.00 MF$0.65

MEASUREMENT OF THE REFRACTIVE INDEX IN AN ARGON PLASMA AT 6328A AND 1.15 MICRONS.
Technical rept. (Final),
Northwestern Univ Evanston Ill Gas Dynamics Lab
W. F. Hug, R. S. Tankin, and A. B. Cambel. Dec 67, 172p
ARL-67-0218
Contract AF-33 (615)-1160

Descriptors: (*Argon, Plasma medium), (*Plasma medium, Refractive index), Line spectrum, Ground state, Measurement, Electron density, Thermodynamics, Interferometers.
Identifiers: *Plasma diagnostics.

The refractive index was measured at wavelengths of 6328A and 1.15 microns in an argon plasma produced by a D.C. electric arc. The refractive index was correlated with temperatures determined from atomic line and continuum emission coefficient measurements. The experimental results were compared with simple dispersion theory which considers contributions from ground state atoms and free electrons. (Author)
AD-666 665 HC$3.00 MF$0.65

AERODYNAMIC STUDY OF AN ARGON PLASMA,
Cornell Univ Ithaca N Y Dept of Aerospace Engineering
Dale B. Henderson. 31 Jan 68, 8p
AFOSR-68-0490
Contract AF 49 (638)-1346
Availability: Published in Physics of Fluids, v10 n9 p1962-7 Sep 1967.

Descriptors: (*Magnetohydrodynamics, Argon), Plasma medium, Aerodynamics, Plasma generators, Kinetic theory, Radiofrequency, Free flight models, Flow visualization, Dispersion relations.
Identifiers: Plasma diagnostics.

An rf argon plasma generator was built in combination with a ballistic range. Spheres are photographed in free flight (at about 2 km/sec) through the plasma with an imbedded magnetic field using an image converter camera. From a series of such photographs the stand-off distance of the bow shock wave is measured as a function of velocity. From this function the state of the neutral gas is deduced; from analysis of spectral data, the state of the electron gas is deduced. A model for the plasma is constructed from these data using a kinetic-theory approach. This model features a neutral gas temperature which is uniform over most of the plasma and an electron temperature which is elevated by 900K in the outer skin depth. This model is not in agreement with previous studies of similar plasmas, these previous studies lacking any direct knowledge of the neutral gas state. (Author)
AD-666 725 Not available from CFSTI.

CORRECT FORMULATION OF AIRFOIL PROBLEMS IN MAGNETOAERODYNAMICS.
Revised ed.,
Cornell Univ Ithaca N Y
D. N. Fan, and G. S. S. Ludford. 16 Aug 67, 6p
AROD-5329:10
Contract DA-31-124-ARO (D)-325
Revision of report dated 29 Jun 67.
Availability: Published in AIAA Journal, v6 n1 p167-9 Jan 68.

Descriptors: (*Airfoils, *Magnetohydrodynamics), Equations of motion, Magnetic fields, Camber, Thickness, Theory.
Identifiers: Crossed-fields theory, Aligned-fields theory.

Airfoil theory in a gas of arbitrary electrical conductivity was formulated with some care and two flow configurations, namely crossed- and aligned-fields, were considered in detail. (Author)
AD-666 871 Not available from CFSTI.

VELOCITY OF MOVING STRIATIONS,
Aerospace Research Labs Wright-Patterson AFB Ohio
A. Garscadden, and D. A. Lee. Sep 67, 5p Rept 68-0010
Availability: Published in The Physics of Fluids, v10 n9 p2093-5 1967.

Descriptors: (*Plasma medium, Velocity), Plasma oscillations, Diffusion, Pressure, Dispersion relations, Magnetohydrodynamics.
Identifiers: *Plasma striations, Ion sound waves.

The phase velocity of moving striations is calculated from the theory of Pekarek. It is shown that in the ambipolar diffusion regime this gives satisfactory agreement with the recent measurements on the variation of striation velocity as the gas pressure is changed. (Author)
AD-666 891 Not available from CFSTI.

BOUNDARY EFFECTS ON THE ENERGY LOSS OF CHARGED PARTICLES,
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 20H.
AD-666 943 HC$3.00 MF$0.65

STUDY OF COLLISION PROCESSES IN GASEOUS PLASMAS.
Final rept. 30 Nov 64-30 Nov 67,
Minnesota Univ Minneapolis Dept of Electrical Engineering
H. J. Oskam. Jan 68, 23p
AFCRL-68-0072
Contract AF 19 (628)-4794

Descriptors: (*Plasma medium, Interactions), Afterglows, Helium, Mass spectroscopy, Neon, Nitrogen, Gas ionization, Recombination reactions, Ions, Mobility, Catalysis, Surfaces, Atmosphere entry.

Results obtained from studying the mobility of ions and the properties of decaying plasmas are summarized. The measuring method consisted of the simultaneous application of pulse techniques and mass and light spectrometer techniques. The plasmas studied were produced in helium, neon, nitrogen, helium-neon mixtures, and helium-nitrogen mixtures. Long existing discrepancies in the explanation of the origin of the afterglow light emission were resolved in helium and neon. Information about electron-ion recombination processes was obtained. The same was possible with respect to the mobility of positive ions in their parent gas. The studies performed on nitrogen afterglows resulted in establishing the production of N2 (+) nitrogen afterglows resulted in establishing the production of N2 (+) ions by mutual collisions between metastable molecules. A theory and method for determining the catalytic efficiency of a surface for recombination of nitrogen atoms were developed. (Author)
AD-666 946 HC$3.00 MF$0.65

INVESTIGATIONS OF IONIC SPECIES IN HIGH PRESSURE CESIUM DISCHARGES.
Annual rept. 1 Mar 67-29 Feb 68,
Minnesota Univ Minneapolis Inst of Tech
Lorne M. Chanin. 29 Feb 68, 44p
Contract N00014-67-A-0113-002

Descriptors: (*Plasma medium, *Mass spectroscopy), (*Cesium, Plasma medium), Ions, High-pressure research, Gas discharges, Additives, Argon, Mixtures, Gas ionization, Excitation.
Identifiers: Seedants.

Measurements are reported of ion species present in active rf and dc plasmas of argon and cesium. Comparison is made of data obtained using ion extraction through the anode and cathode of a dc plasma with measurements made using rf excitation of the plasma. (Author)
AD-666 970 HC$3.00 MF$0.65

THEORY OF THE DAMPING OF ALFVEN WAVES IN BISMUTH METAL,
Utah Univ Salt Lake City Dept of Physics
D. H. Brownell, Jr., and E. H. Hygh. 13 Feb 68, 10p
AFOSR-68-0591
Grant AF-AFOSR-901-65
Availability: Published in Physical Review, v164 n3 p916-22 Dec 15 1967.

Descriptors: (*Plasma oscillations, Damping), Magnetohydrodynamics, Plasma medium, Ionization, Impurities, Bismuth, Magnetic fields, Tensor analysis, Scattering, Special functions (Mathematical).

The theory of the relaxation frequency tensor for an ellipsoidal conduction band is developed, and calculated for the case of the electron and hole bands in bismuth assuming ionized impurity scattering. The theory of Alfven-wave propagation is developed, and the ratios of relaxation times for several different field orientations are calculated. The results are compared with McLachlan's data. Possible mechanisms for the damping, including Frenkel defects, are discussed. (Author)
AD-667 096 Not available from CFSTI.

INVESTIGATION OF PLASMA ROTATION IN PULSED INDUCTIVE ACCELERATOR,
TRW Systems Redondo Beach Calif
For primary bibliographic entry see Field 21C.
AD-667 099 Not available from CFSTI.

INTERACTION OF A TRAVELING MAGNETIC FIELD WITH RIGID CONDUCTING SPHERES OR CYLINDERS.
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
For primary bibliographic entry see Field 20C.
AD-667 122 Not available from CFSTI.

KINETIC THEORY OF TWO-TEMPERATURE PLASMAS,
Stanford Univ Calif
C. H. Kruger, and M. Mitchner. 4 Mar 68, 11p
AFOSR-68-0625
Contract AF 49 (638)-1695
Revision of report dated 22 Aug 66.
Availability: Published in Physics of Fluids, v10 n9 p1953-61 Sep 1967.

Descriptors: (*Plasma medium, *Kinetic theory), Transport properties, Electrons, Energy, Gas ionization, Thermal conductivity, Electrical conductance, Thermal diffusion, Inelastic scattering, Interactions, Excitation.
Identifiers: *Two-temperature plasmas.

A closed formulation is presented for the electron energy equation together with the associated electron transport properties, applicable to a two-temperature partially ionized gas at intermediate and high degrees of ionization. Complete and simplified formulas to arbitrary levels of approximation in the Chapman-Enskog sense are given for the calculation of the electron thermal and electrical conductivities and thermal diffusion coefficients in the presence of a magnetic field. The effects of nonelastic collisions on electron transport property calculations are discussed and a criterion is presented for assessing when such collisions may be neglected. (Author)
AD-667 130 Not available from CFSTI.

THE PROBLEM OF THE EXPERIMENTAL CONFIRMATION OF LANDAU DAMPING.
Interim rept.,
Syracuse Univ N Y Dept of Electrical Engineering
Gordon Kent. 18 Mar 68, 17p
AFOSR-68-0636
Contract AF 49 (638)-1374
Availability: Published in International Journal of Electronics, v22 n5 p397-411 1967.

Descriptors: (*Plasma medium, Damping), (*Electron beams, Damping), One-dimensional flow, Velocity, Integral equations, Plasma oscillations, Equations of motion, Electric fields.
Identifiers: *Landau damping.

The experimental confirmation of Landau damping in a one-dimensional plasma or electron beam requires the measurement of the velocity distribution, the wave amplitude as a function of time or space, and the numerical solution of the Volterra integral equation through which these data are theoretically related. It is shown that the errors inherent in the two measurements are, under the best of circumstances, of such magnitude that it is not possible to adduce a damping law. The analysis is devoted for the most part to the spatial damping on an electron beam, and a typical numerical example is given. (Author)
AD-667 132 Not available from CFSTI.

TEMPERATURE EFFECTS OF WHISTLER RESONANCE.
Interim rept.,
Syracuse Univ N Y Dept of Electrical Engineering
Gordon Kent. 18 Mar 68, 11p
AFOSR-68-0635
Contract AF 49 (638)-1374
Availability: Published in Journal of Applied Physics, v38 n12 p4873-81 Nov 67.

Descriptors: (*Plasma medium, Resonance), Plasma physics, Theory, Temperature, Refractive index, Magnetic fields, Microwave equipment, Density, Fourier analysis, Integral transforms.
Identifiers: Whistler resonance, Plasma diagnostics.

The effects of longitudinal temperature on the index of refraction of the whistler mode are calculated. The theory involves an unusual assumption on the initial rf velocity, and as a consequence the problem is stated in terms of a singular integral equation. The integral equation is solved with no limitation on the analyticity of the distribution function. Numerical data are given showing the index of refraction as a function of magnetic field, with temperature as a parameter. The whistler resonance responses of two structures are presented, and a necessary condition for the observation of a whistler resonance in a one-dimensional warm plasma is derived. It is proposed that the whistler d be used for plasma diagnostics
in a discharge produced in a microwave cavity. (Author)
AD-667 134 Not available from CFSTI.

ENHANCEMENT OF ION CYCLOTRON WAVES IN HYDROGEN HELIUM MIXTURES.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
H. J. Hettel, R. Krawec, G. M. Prok, and C. C. Swett. Mar 68, 35p NASA-TN-D-4271
Contract 129-01-05-09-22

Descriptors: *Helium, *Hydrogen plasma, *Ion cyclotron radiation, *Metastable atoms, Augmentation, Electromagnetic absorption, Ionic waves, Plasma probes, Proton density (concentration), Radio frequencies.

For abstract, see STAR 06 09.
N68-18485 HC$3.00 MF$0.65

A STUDY OF THE POSSIBLE USES OF PLASMA FOR MILLIMETER WAVE GENERATION.
National Aeronautics and Space Administration. Electronics Research Center, Cambridge, Mass.
R. E. Mc Intosh. Mar 68, 28p NASA-TN-D-4309
Contract 129-02-03-01-25

Descriptors: *Beam plasma amplifiers, *Electron beams, *Millimeter waves, *Plasma-particle interactions, Gas discharges, Harmonic generations, Plasma interactions, Radio frequencies, Wave generation, Wave propagation.

For abstract, see STAR 06 09.
N68-18614 HC$3.00 MF$0.65

ATTENUATION AND DISPERSION OF LONGITUDINAL WAVES IN VISCOUS, PARTLY IONIZED GASES.
National Aeronautics and Space Administration. Electronics Research Center, Cambridge, Mass.
D. Kahn. Mar 68, 9p NASA-TM-X-1458

Descriptors: *Ionized gases, *Longitudinal waves, *Wave attenuation, *Wave dispersion, Boltzmann-vlasov equation, Collisionless plasmas, Collisions, Conductive heat transfer, Maxwell equation, Particle interactions, Viscosity, Wave propagation.

For abstract, see STAR 06 09.
N68-18703 HC$3.00 MF$0.65

A KINETIC THEORY BOUNDARY VALUE PROBLEM IN A FLOWING PLASMA - THE IMPEDANCE OF A GRID PAIR.
Pennsylvania State Univ., University Park.
D. P. Mioduszewski. 1 Mar 68, 103p NASA-CR-93428, SR-316
Contracts NGR-39-009-032, NSF GP-5611

Descriptors: *Boundary value problems, *Electrical impedance, *Grids, *Kinetic theory, *Magnetohydrodynamic flow, Differential equations, Fourier transformation, Laplace transformation, Numerical analysis.

For abstract, see STAR 06 09.
N68-18725 HC$3.00 MF$0.65

PULSED ELECTROMAGNETIC GAS ACCELERATION SEMIANNUAL PROGRESS REPORT, 1 JUL. - 31 DEC. 1967.
Princeton Univ., N. J. Dept. of Aerospace and Mechanical Sciences.
R. G. Jahn, and W. F. Von Jaskowsky. 1 Jan 68, 131p NASA-CR-93542, SAPR-11
Grant NSG-306-63

Descriptors: *Electromagnetic fields, *Gas dynamics, *Plasma accelerators, *Shock tubes, Electric arcs, Electrodes, Flow distribution, Gas flow, Plasma jets.

For abstract, see STAR 06 09.
N68-18930 HC$3.00 MF$0.65

GROWTH AND DECAY OF MAGNETIC FIELDS IN TURBULENT FLUIDS.
National Aeronautics and Space Administration. Goddard Inst. for Space Studies, New York.
J. J. Cocke. Mar 68, 29p NASA-TM-X-60924

Descriptors: *Magnetic fields, *Ohmic dissipation, *Plasma conductivity, *Turbulence, Applications of mathematics, Equations of motion, Fourier analysis, Losses, Magnetohydrodynamics, Plasma physics, Statistical analysis, Statistical distributions, Turbulent flow.

For abstract, see STAR 06 09.
N68-19005 HC$3.00 MF$0.65

KINETIC THEORY OF INHOMOGENEOUS SYSTEMS.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
J. C. Price. Mar 68, 66p NASA-TM-X-63131, X-641-68-89

Descriptors: *Boltzmann transport equation, *Kinetic theory, *Time functions, Applications of mathematics, Approximation, Plasma physics, Scattering cross sections, Transport properties.

For abstract, see STAR 06 09.
N68-19082 HC$3.00 MF$0.65

SOLUTION OF THE BOLTZMANN AND RATE EQUATIONS FOR THE ELECTRON DISTRIBUTION FUNCTION AND STATE POPULATIONS IN NONEQUILIBRIUM MHD PLASMAS.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
L. U. Albers, J. V. Dugan, Jr., and F. A. Lyman. 1966, 20p NASA-TM-X-52190, SM-74/191
Refs Conf- Presented At Intern. Symp. on Magnetohydrodyn. Elec. Power Generation, Sponsored By Intern. Atomic Energy Agency and European Nucl. Energy Agency, Salzburg, Austria, 4-8 Jul. 1966

Descriptors: *Boltzmann distribution, *Electron mass, *Mathematical models, *Nonequilibrium plasmas, *Plasma dynamics, Electric fields, Equilibrium flow, Kinetic theory, Magnetohydrodynamics, Theoretical physics.

For abstract, see STAR 06 09.
N68-19141 HC$3.00 MF$0.65

INVESTIGATIONS OF GAS-CONDITIONS IN THE OPERATION OF A COAXIAL PLASMA INJECTOR.
Badania Warunkow Gazowych Przy Pracy Koaksjalnego Iniektora Plazmonego
Polish Academy of Sciences, Warsaw. Inst. of Nuclear Research.
Z. Kozlowski, and M. Sadowski. 1967, 39p INR-861/18/PP

Descriptors: *Coaxial plasma accelerators, *Gas analysis, *Gas composition, *Plasma generators, *Residual gas, Equilibrium, Ion injection.

For abstract, see STAR 06 09.
N68-19488 HC$3.00 MF$0.65

EXPERIMENTAL STUDIES OF A COAXIAL PLASMA INJECTOR. 1 - STUDY OF OPERATIONAL CONDITIONS.
Eksperymentalne Badania Koaksjalnego Iniek-Tora Plazmowego. 1 - Okreslenie Warunkow Eksploatacji
Polish Academy of Sciences, Warsaw. Inst. of Nuclear Research.
M. Sadowski, and E. Skladnik-sadowska. 1967, 27p INR-850/18/PP

Descriptors: *Coaxial flow, *Coaxial plasma accelerators, *Ion injection, *Optimization, Independent variables, Operations research, Plasma generators, Plasma guns, Quality control.

For abstract, see STAR 06 09.
N68-19489 HC$3.00 MF$0.65

20J. Quantum Theory

THE PHOTOELECTRIC EFFECT WITHOUT PHOTONS,
Miami Univ Coral Gables Fla Center for Theoretical Studies
For primary bibliographic entry see Field 20C.
AD-666 821 HC$3.00 MF$0.65

S-MATRIX THEORY OF LOCAL MOMENTS,
California Univ San Diego La Jolla
H. Suhl. 18 Sep 67, 92p

Group 20J—Quantum theory

AFOSR-68-0585
Grant AF-AFOSR-610-64
Availability: Published in Estratto da Rendiconti della Scuola Internazionale di Fisica E. Fermi, v37 p116-205 1966.

Descriptors: (*Magnetic moments, *S-matrix), Magnetic materials, Alloys, Quantum mechanics, Potential scattering, Wave functions, Dispersion relations, Superconductors.

Scattering theory is developed with a view to application to dilute magnetic alloys. Anomalous resistivity behavior is discussed and various extensions of the theory to more complex situations are presented. (Author)
AD-666 844 Not available from CFSTI.

ON THE COMMUTATION RULES BETWEEN AXIAL CHARGES AND AXIAL DIVERGENCES,
Turin Univ (Italy) Inst of Theoretical Physics
G. Soliani. 1 Aug 66, 7p
AFOSR-68-0567
Grant AF-EOAR-29-66
Availability: Published in Nuovo Cimento, Ser10 v44 n3 p829-33 Aug 1 1966.

Descriptors: (*Elementary particles, Interactions), Decay schemes, Operators (Mathematics), Quantum mechanics, Groups (Mathematics), Beta decay, Italy.
Identifiers: *Commutation relations, Sum rules, Symmetry (Quantum mechanics).

Commutators are derived, within the framework of 'the product of SU3 and SU3,' between axial charges and axial divergences. A simple example is given which demonstrates the advantages of sum rules which these relations yield.
AD-667 010 Not available from CFSTI.

SUPERCONVERGENCE SUM RULES IN NUCLEON-NUCLEON SCATTERING,
Turin Univ (Italy) Inst of Theoretical Physics
For primary bibliographic entry see Field 20H.
AD-667 011 Not available from CFSTI.

FINITE TRANSLATIONS IN SOLID-STATE PHYSICS,
Massachusetts Inst of Tech Cambridge National Magnet Lab
J. Zak. 28 Feb 68, 5p Rept no. JP-280
AFOSR-68-0563
Contract F44620-67-C-0047
Availability: Published in Physical Review Letters v19 n24 p1385-7 Dec 11 1967.

Descriptors: (*Operators (Mathematics), *Quantum mechanics), Brillouin zones, Electrons, Magnetic fields, Crystal lattices, Solid state physics, Perturbation theory, Hamiltonian, Wave functions, Band theory of solids.
Identifiers: Eigenvalues, Bloch electrons, Schrodinger equation.

Eigenvalues of finite translations are used for specifying a complete set of states in quantum mechanics. A derivation of these states is given and they are shown to be very useful in solid-state physics. (Author)
AD-667 019 Not available from CFSTI.

SUPERCONVERGENCE AND CURRENT ALGEBRA,
Turin Univ (Italy) Inst of Theoretical Physics
For primary bibliographic entry see Field 20H.
AD-667 044 Not available from CFSTI.

QUANTUM SPECTROSCOPY OF THE LOW FIELD OSCILLATIONS OF THE SURFACE IMPEDANCE,
Maryland Univ College Park
T. W. Nee, and R. E. Prange. 23 Oct 67, 4p
AFOSR-68-0561
Grant AF-AFOSR-735-65
Availability: Published in Physics Letters, v25A n8 p582-3 Oct 23 1967.

Descriptors: (*Band theory of solids, Metals), Atomic energy levels, Spectroscopy, Electrons, Magnetic fields, Hamiltonian, Quantum mechanics, Superconductors, Interactions, Microwaves, Line spectrum, Theses.
Identifiers: Fermi surfaces, Quantum spectroscopy.

Transitions between magnetic surface levels, quantum mechanical 'bound' states of electrons trapped by a magnetic field along a metallic surface, account for oscillations in the surface impedance and yield new information on Fermi surface properties as well as surface scattering of electrons. (Author)
AD-667 051 Not available from CFSTI.

THEORY OF SELF-INDUCED STRONG INTERACTIONS,
Yeshiva Univ New York Belfer Graduate School of Science
Leonard Susskind, and Graham Frye. 12 Mar 68, 56p
AFOSR-68-0575
Grant AF-AFOSR-1282-67
Prepared in cooperation City Coll., New York.
Availability: Published in The Physical Review, v164 n5 p2003-56 25 December 1967.

Descriptors: (*Elementary particles, Interactions), Vector analysis, Hamiltonian, Quantum statistics, Matrix algebra, Theory.
Identifiers: Hadrons, Strong interactions.

A theory of strong interactions, based on the idea that each hadron is a composite of other similar hadrons, is constructed. The necessary concepts of composite-particle structure are defined in terms of linear relations between the vectors describing single-particle states and certain multiparticle vectors which are not energy eigenstates. The theory is not a S-matrix theory, but rather, it directly represents the instantaneous interactions and time development of a system of particles in terms of the interactions of the objects which make up the particles, namely, other similar particles. The Hamiltonian is constructed so as to propagate particles freely when they are far apart, and to provide the necessary binding forces to bind the composites when the particles are close. These same forces are, of course, responsible for the scattering and particle reactions which occur for colliding particles. All of this is done without the use of the local-field concept. The particle states used as a basis in the space of states describe fully clothed 'real' structures. (Author)
AD-667 063 Not available from CFSTI.

ON LEMMA 3 of ZEEMAN.
Interim rept.,
Turin Univ (Italy) Inst of Theoretical Physics
G. Barucchi, and G. Teppati. 21 Sep 67, 6p
AFOSR-68-0565
Grant AF-EOAR-29-66
Availability: Published in Il Nuovo Cimento, s10 v51A p529-32 21 Sep 67.

Descriptors: (*Groups (Mathematics), Theorems), Permutations, Set theory, Mapping (Transformations), Quantum mechanics, Light, Italy.

The demonstration of Lemma 3 of Zeeman is discussed. (Author)
AD-667 089 Not available from CFSTI.

LANGEVIN METHOD FOR DAMPED QUANTUM-MECHANICAL SYSTEMS,
Army Electronics Command Fort Monmouth N J Inst for Exploratory Research
I. R. Senitzky. Sep 67, 3p
Availability: Published in The Physical Review, v161 n1 p165-7 Sep 5 1967.

Descriptors: (*Operators (Mathematics), Quantum mechanics), Statistical functions, Statistical processes, Nonlinear systems, Damping.
Identifiers: Langevin forces, Moment method.

It is shown that the Langevin forces needed to convert expectation-value equations into operator equations for a two-level system cannot be Gaussian, and arguments are presented for extending this result to other nonlinear systems. In order to satisfy quantum-mechanical requirements, a generalization to higher-order moments of a procedure used for specifying second-order moments of the Langevin forces is proposed. (Author)
AD-667 114 Not available from CFSTI.

BOOTSTRAPLIKE CONDITIONS FROM SUPERCONVERGENCE,
Harvard Univ Cambridge Mass
For primary bibliographic entry see Field 20H.
AD-667 168 Not available from CFSTI.

THE PHOTOELECTRIC EFFECT WITHOUT PHOTONS.
Miami Univ., Fla. Center for Theoretical Studies.
W. E. Lamb, Jr., and M. O. Scully. Feb 68, 15p
NASA-CR-93557, TS-QED-68-1
Contracts NGR-10-007-010, ARPA SD-90

Descriptors: *Mathematical models, *Photoelectric effect, *Photons, Electromagnetic fields, Electrons, Equations of motion, Hamiltonian functions, Matrices (mathematics), Perturbation, Quantum electrodynamics.

For abstract, see STAR 06 09.
N68-19038 HC$3.00 MF$0.65

20K. Solid Mechanics

MEASUREMENTS OF STRESS AND STRAIN ON CYLINDRICAL TEST SPECIMENS OF ROCK AND CONCRETE UNDER IMPACT LOADING.
Final rept.,
Ohio River Div. Labs., Cincinnati.
Frank M. Mellinger, and Donald L. Birkimer. Apr 66, 78p ORDL-EC-TR-4-46

Descriptors: (*Concrete, Tensile properties), (*Rock (Geology), Impact tests), Stresses, Strain (Mechanics), Cylinderical bodies, Reinforced concrete, Compressive properties, Loading (Mechanics), Shock waves, Impact shock, Projectiles, Explosive materials, Fracture (Mechanics), Electronic equipment, Velocity, Aluminum, Quartz, Calibration tests, Strain gages, Physical properties.

A test method to determine the minimum dynamic tensional stress required to rupture materials that have a high compressive strength and a relatively low tensile strength is evaluated. The test loading is by impact from an air-fired projectile. The loading device utilizes a 250-gram projectile, and can produce an impact momentum varying from zero to over three pound-seconds. The rise time of the stressing pulse or shock wave produced in the test pieces is in the order to 20 to 30 microseconds, and the pulse length about 10 inches. The test method considered is based on the measurement of the velocity imparted to a pellet lightly attached to the distal end of a cylindrical test specimen subjected to the impact of an air-fired projectile. This velocity measurement provides the basis for computing the maximum longitudinal stress or strain created in the test specimen by the impact loading. The validity of this test method, which is designated as the 'pellet technique', is evaluated by attaching strain gages to the test specimens and comparing this direct measurement of maximum longitudinal strain with that indicated by the pellet technique. (Author)
AD-480 990 HC$3.00 MF$0.65

THE EFFECT OF VACUUM ON SURFACE DAMAGE IN FATIGUE.

Texas Univ Austin Engineering Mechanics Research Lab
For primary bibliographic entry see Field 11F.
AD-666 678 HC$3.00 MF$0.65

IMPROVED INTERNAL FRICTION APPARATUS,
Northwestern Univ Evanston Ill Dept of Materials Science
For primary bibliographic entry see Field 14B.
AD-666 733 Not available from CFSTI.

BEHAVIOR OF CIRCULAR TUBES BURIED IN SAND UNDER DYNAMIC LOADING.
Army Engineer Waterways Experiment Station Vicksburg Miss
For primary bibliographic entry see Field 13M.
AD-666 768 HC$3.00 MF$0.65

PHOTOELASTIC DETECTION OF ULTRASONIC PULSES.
Technical note,
Army Materials Research Agency Watertown Mass
John J. Maguire. Dec 63, 14p Rept no. AMRA-TN-63-07

Descriptors: (*Ultrasonic radiation, Detection), (*Photoelasticity, Ultrasonic radiation), Transparent panels, Polarization, Interactions, Diffraction, Stresses, Experimental design.
Identifiers: Pulsed operation.

An experiment is designed which has the potential to allow a visual detection of progressive ultrasonic pulsed vibrations in transparent media. Various materials, solid and liquid, are employed and the results of each investigation are presented. Difficulties encountered are discussed, and suggestions for improvements are offered. (Author)
AD-666 805 HC$3.00 MF$0.65

FINITE EXPANSION OF A HOLE IN A RIGID-WORKHARDENING DISK OF INITIALLY NON-UNIFORM THICKNESS.
California Univ San Diego La Jolla Dept of the Aerospace and Mechanical Engineering Sciences
For primary bibliographic entry see Field 7B.
AD-666 831 HC$3.00 MF$0.65

A STUDY OF BUCKLING AND SNAPPING UNDER DYNAMIC LOAD,
Aerospace Corp El Segundo Calif Lab Operations
M. H. Lock. Dec 67, 53p Rept no. TR-0158 (3240-30)-3
SAMSO-TR-68-100
Contract F04695-67-C-0158

Descriptors: (*Structures, *Loading (Mechanics)), Dynamics, Buckling (Mechanics), Elasticity, Plasticity, Classification, Response, Rings, Pulse systems, Stability.
Identifiers: Arches (Structures).

The behavior of a shallow arch and a thin ring under a dynamic pulse loading is studied for a wide range of geometric and load parameters. The nonlinear dynamic response and static load deflection characteristics of the systems are related and employed to define dynamic elastic snapping and dynamic elastic buckling. When such a relationship cannot be established, the mechanism of dynamic elastic-plastic buckling is introduced. Critical dynamic load criteria are specified, and critical dynamic load data are developed as a function of structural geometry and load duration. Finally, a classification scheme for dynamic load problems is suggested. (Author)
AD-666 914 HC$3.00 MF$0.65

THE INFLUENCE OF STIFFENER GEOMETRY AND SPACING ON THE BUCKLING OF AXIALLY COMPRESSED CYLINDRICAL AND CONCIAL SHELLS,
Technion - Israel Inst of Tech Haifa Dept of Aeronautical Engineering
Josef Singer. Oct 67, 102p Rept nos. Scientific-3, TAE-68
AFOSR-68-0670
Contract AF 61 (052)-905
Prepared for presentation at the IUTAM Symposium on the Theory of Thin Shells (2nd) Copenhagen, September 8, 1967. See also Scientific-2, AD-662 358.

Descriptors: (*Stiffened cylinders, Buckling (Mechanics)), (*Structural shells, Buckling (Mechanics)), Conical bodies, Rings, Reinforcing materials, Structural properties, Stability, Linear systems, Efficiency, Theory.

An experimental and theoretical study of the buckling of closely stiffened cylindrical and conical shells under axial compression was undertaken to determine the influence of the stiffener geometry and spacing on the applicability of linear theory. Tests on integrally ring-stiffened cylinders, in which the spacing, cross-sectional area and eccentricity of the stiffeners is varied are described. The bounds of general instability are first determined by an elementary analysis of sub-shells and panels between stiffeners, in conjunction with 'smeared' stiffener theory. The interaction between stiffeners and shell is then investigated with a linear discrete-stiffener theory. The experimental results are correlated with theory and approximate design criteria are developed. Experimental results and conclusions of other investigators are also discussed. The results of a test program of integrally ring-stiffened conical shells are briefly discussed and correlated with the results obtained for cylindrical shells. The structural efficiency of closely stiffened cylindrical shells is then studied in view of the observed bounds of applicability of linear theory. (Author)
AD-666 920 HC$3.00 MF$0.65

STABILITY OF STRAIGHT BARS SUBJECTED TO REPEATED IMPULSIVE COMPRESSION.
Technical rept.,
Northwestern Univ Evanston Ill Structural Mechanics Lab
Dusan P. Krajcinovic, and George Herrmann.
Dec 67, 39p Rept no. TR-67-8
AFOSR-68-0003
Grant AF-AFOSR-100-67

Descriptors: (*Rods, Structural properties), Structural parts, Elasticity, Impact shock, Resonance, Sandwich construction, Beams (Structural), Compressive properties, Periodic variations, Vibration, Loading (Mechanics), Boundary value problems.
Identifiers: Parametric resonance, Impulsive loading.

The problem of the parametric resonance of a straight bar subjected to a periodic impulsive axial compression is analyzed. With the aid of the Floquet theory the boundaries of the instability regions (unbounded transverse motions) are established. The general results are illustrated with several specific examples, including elastically supported and sandwich beams for various boundary conditions. The new results are qualitatively related to the cases of parametric resonance problems of corresponding beams studied previously. (Author)
AD-666 921 HC$3.00 MF$0.65

COMPARATIVE STUDY OF OPTIMIZATION TECHNIQUES FOR SHOCK AND VIBRATION ISOLATION,
Massachusetts Inst of Tech Cambridge Dept of Mechanical Engineering
D. C. Karnopp, and A. K. Trikha. Jan 68, 44p
AFOSR-68-0242
Contract AF 49 (638)-1314

Descriptors: (*Shock (Mechanics), Vibration isolators), Vibration, Vibration isolators, Equations of motion, Optimization, Damping, Springs, Mathematical analysis, Systems engineering, Deflection, Landing gear, Shock absorbers.
Identifiers: Tradeoffs, Bang-bang systems.

Several optimum and sub-optimum isolators are discussed with respect to three different criteria appropriate to shock and vibration isolation. In attempting to show the limitations of performance of a system optimized according to one criterion when considered from the point of view of another criterion, a number of advantages and disadvantages of the optimum systems are made evident. The results are presented in trade-off diagrams which allow a continuous range of choice in penalizing measures of relative displacement and force or acceleration of the isolated element. (Author)
AD-666 928 HC$3.00 MF$0.65

NONLINEAR BOUNDARY VALUE PROBLEMS FOR THE CIRCULAR MEMBRANE.
Technical rept.,
New York Univ N Y Courant Inst of Mathematical Sciences
Andrew J. Callegari, and Edward L. Reiss. Feb 68, 32p Rept no. IMM-365
Contracts Nonr-285 (42), N00014-67-A-0467

Descriptors: (*Membranes, *Deformation), (*Boundary value problems, Membranes), Stresses, Initial value problems, Numerical analysis, Functions, Theorems.
Identifiers: Existence theorems, Uniqueness theorem.

Existence and uniqueness theorems are proved for two boundary value problems for the axisymmetric deformation of a circular membrane subjected to normal pressure. The nonlinear Foppl membrane theory is employed. The shooting method is used to establish these results. It is also shown that if the edge is free to move in the plane of the membrane then a necessary and sufficient condition for the existence of a unique solution is that the pressure is self-equilibrating. The shooting method is applied to obtain a numerical solution of the fixed edge membrane with uniform normal pressure. (Author)
AD-666 961 HC$3.00 MF$0.65

ON THE ELASTIC CONSTANTS OF POLYCRYSTALLINE ARGON.
Rutgers - the State Univ New Brunswick N J Dept of Physics
For primary bibliographic entry see Field 7D.
AD-667 007 Not available from CFSTI.

SUB- AND SUPERHARMONIC SYNCHRONIZATION IN WEAKLY NONLINEAR SYSTEMS: INTEGRAL CONSTRAINTS AND DUALITY.
Harvard Univ Cambridge Mass Div of Engineering and Applied Physics
For primary bibliographic entry see Field 12A.
AD-667 017 Not available from CFSTI.

BUCKLING OF UNSTIFFENED CONICAL SHELLS UNDER COMBINED LOADING,
Technion - Israel Inst of Tech Haifa Dept of Aeronautical Engineering
For primary bibliographic entry see Field 13M.
AD-667 127 Not available from CFSTI.

THE MECHANICS OF REPEATED DISCONTINUOUS YIELDING OF METALS.
Revised ed.,
Technion - Israel Inst of Tech Haifa
Sol R. Bodner. 8 Aug 67, 13p
AFOSR-68-0628
Contract AF 61 (052)-951
Revision of report dated 29 May 67.
Availability: Published in Materials Science and Engineering v2 p213-23 Nov 1967.

Descriptors: (*Metals, Deformation), Dynamics, Aluminum, Aging (Materials), Hardening, Dislo-

cations, Equations of motion, Strain (Mechanics), Stresses.
Identifiers: Strain aging.

An explanation is proposed for the occurrence of repeated discontinuous yielding of metals. The discussion is based primarily on observations for slightly impure aluminum, but is sufficiently general to apply to most metals. The responsible material property is considered to be time-dependent strengthening that takes place during yielding. The details of the discontinuities, i.e. whether steps or serrations appear on the stress-strain relation, are shown to depend on the mechanics of the test procedure. The dislocation processes involved in repeated discontinuous yielding are described in terms of the equations of dislocation dynamics. The hypothesis of successive breakaway of dislocations from pinning points appears to be unnecessary in explaining this effect. (Author)
AD-667 128 Not available from CFSTI.

HARDNESS MODULUS AS AN ALTERNATE MEASURE OF HARDNESS TO THE STANDARD JANKA BALL FOR WOOD AND WOOD-BASE MATERIALS.
Forest Products Lab Madison Wis
For primary bibliographic entry see Field 11L.
AD-667 176 Not available from CFSTI.

FURTHER WORK ON STRESS CONCENTRATIONS IN U-SHAPED GROOVES.
Technical research rept.,
Frankford Arsenal Philadelphia Pa Pitman-Dunn Research Labs
Paul D. Flynn, and Joseph T. Gilbert. 1967, 13p FA-A67-18
Availability: Published in JSME 1967 Semi-International Symposium papers, Experimental Mechanics, v1, p141-6, paper no. 118.

Descriptors: (*Stresses, Notch sensitivity), (*Photoelasticity, Models (Simulations)), Tensile properties, Calibration, Experimental design, Loading (Mechanics), Accuracy.

A two-dimensional photoelastic study was made of the stress concentration factors in a statically loaded tension bar with symmetrical U-shaped grooves (w/r = 8, d/r = 8 to 1/4) using the self-calibrating source of stress concentration method. The high accuracy of this method was demonstrated in a comparison of the stress concentrations due to semicircular grooves and a circular hole (lambda = 2r/W = 0.060 to 0.400). The results of these new experiments are presented and compared with previous work. (Author)
AD-667 178 Not available from CFSTI.

PRESSURE MEASUREMENTS IN BASALT FINAL REPORT, 13 JUN. 1966 - 13 FEB. 1967.
Physics International Co., San Leandro, Calif.
13 Feb 67, 29p NASA-CR-93434
Contract NAS5-9354

Descriptors: *Hypervelocity impact, *Piezoelectric gages, *Pressure measurements, *Pressure sensors, Electric wire, Hypervelocity projectiles, Manganese alloys, Manganin (trademark), Reaction time.

For abstract, see STAR 06 09.
N68-18495 HC$3.00 MF$0.65

AN EXPERIMENTAL STUDY OF THE INFLUENCE OF THE TURBULENT BOUNDARY LAYER ON PANEL FLUTTER.
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
For primary bibliographic entry see Field 1A.
For abstract, see STAR 06 09.
N68-18721 HC$3.00 MF$0.65

ANALYTICAL AND EXPERIMENTAL STUDIES ON GYROSCOPIC VIBRATION ABSORBERS (PART 1), AND ANALYSIS OF PARALLEL DAMPED DYNAMIC VIBRATION ABSORBERS (PART 2) FINAL REPORT.
Kaman Aircraft Corp., Bloomfield, Conn.
A. V. Srinivasan. 1967, 89p NASA-CR-93547
Contract NASW-1394
Descriptors: *Gyrostabilizers, *Structural vibration, *Vibration isolators, Computer programs, Electronic control, Vibration damping, Vibration tests, Vibrational stress.

For abstract, see STAR 06 09.
N68-19126 HC$3.00 MF$0.65

FLUTTER OF CORRUGATION STIFFENED PANELS AT MACH 3 AND COMPARISON WITH THEORY.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
For primary bibliographic entry see Field 1A.
For abstract, see STAR 06 09.
N68-19143 HC$3.00 MF$0.65

PLANE STRESS ANALYSIS OF AN EDGE-STIFFENED RECTANGULAR PLATE, TAKING INTO ACCOUNT BENDING AND SHEAR STIFFNESS OF THE STIFFENERS.
Syracuse Univ. Research Inst., N. Y.
Y.-W. Hsu, and C. Libove. Mar 68, 178p NASA-CR-978, ME-1065-678
Grant NSG-385
Coll- 178 P Refs

Descriptors: *Fourier series, *Isotropy, *Orthotropic plates, *Rectangular plates, *Rigid structures, *Stress analysis, Aircraft design, Aircraft structures, Bending fatigue, Boundary layer stability, Elastic plates, Loads (forces), Numerical analysis, Plastic deformation, Reliability engineering, Shear stress, Stress concentration, Temperature effects, Thermal degradation.

For abstract, see STAR 06 09.
N68-19311 HC$3.00 MF$0.65

APPLICATION OF AASHO ROAD TEST RESULTS TO DESIGN OF FLEXIBLE PAVEMENTS IN MINNESOTA.
Minnesota Univ., Minneapolis. Dept. of Civil Engineering.
For primary bibliographic entry see Field 13B.
PB-177 375 HC$3.00 MF$0.65

STRENGTH EFFECT OF CUTTING OFF TENSION BARS IN CONCRETE BEAMS.
Texas Univ., Austin. Center for Highway Research.
For primary bibliographic entry see Field 11B.
PB-177 700 HC$3.00 MF$0.65

INVESTIGATION OF THE BEHAVIOR OF CONCRETE UNDER TENSILE STRAIN GRADIENTS,
Florida Univ., Gainesville. Engineering and Industrial Experiment Station.
For primary bibliographic entry see Field 13M.
PB-177 707 HC$3.00 MF$0.65

THE DAMPING PROPERTIES OF PLAIN CONCRETE: EFFECT OF COMPOSITION AND RELATIONS WITH ELASTICITY AND STRENGTH,
Road Research Lab., Crowthorne (England).
For primary bibliographic entry see Field 11B.
PB-177 719 HC$3.00 MF$0.65

LOAD CARRYING CAPACITY OF MINNESOTA SECONDARY FLEXIBLE PAVEMENTS.
Minnesota Univ., Minneapolis. Dept. of Civil Engineering.
For primary bibliographic entry see Field 13B.
PB-177 759 HC$3.00 MF$0.65

20L. Solid-State Physics

BIBLIOGRAPHY OF AFCRL PUBLICATIONS FROM 1 JULY 1966 TO 30 SEPTEMBER 1967.
Air Force Cambridge Research Labs L G Hanscom Field Mass
For primary bibliographic entry see Field 5B.
AD-666 664 HC$3.00 MF$0.65

INVESTIGATION OF ORDERED MAGNETIC STATES AND THEIR CORRELATIONS TO OPTICAL AND ELECTRICAL PROPERTIES OF SELECTED MATERIALS.
Final rept., 15 Oct 65-14 Aug 67,
Mithras Inc Cambridge Mass
J. H. Terrell, A. Novanski, J. Schwartz, B. Di Bartolo, and K. Gooen. Oct 67, 131p Rept no. MC-65-172-R1
AFCRL-67-0593
Contract AF 19 (628)-5721

Descriptors: (*Lasers, Electron spin resonance), *Magnetic materials, Transport properties), Alumina, Ruby, Lithium compounds, Germanium compounds, Oxides, Crystal lattice defects, Chromium, Line spectrum, Garnet, Magnetic resonance, Transition temperature, Copper compounds, Chlorides, Magnetic properties, Fluorescence, Absorption spectrum, Atomic energy levels, Magnetic moments, Optical properties, Electrical properties.
Identifiers: Lithium germanium oxides, Cupric chloride, Magnetic susceptibility, *Ordered magnetic states.

A report is given of electron spin resonance (ESR) studies of Cr (3+) in Al2O3 and Li2Ge7O15. Lineshape and linewidth measurements of ruby samples were carried out at K-band both inside and outside the microwave cavity. Mosaic, strain, and hyperfine splitting were found to contribute significantly to the lineshape. A new lineshape expression for the mosaic contribution was proposed. A method of testing the quality of large pieces of ruby, e.g., laser rods, without the need for cutting or any other destructive process was conceived under this contract. The magnetic properties of Y3Fe3.2Ga1.8O12 are reported based upon ferromagnetic resonance linewidth, anisotropy constants, and magnetization measurements. Particular attention is paid to the effect of 'impurities' such as unordered Fe (3+) resulting from gallium substitution. Critical exponents were determined from magnetization measurements near the Curie point and are compared to Anderson's results for pure YIG. Anomalies in the susceptibility tensor Xyx of the spin-flop transition in CuCl2.2H2O were studied. The effect of the sample shape is included exactly through the use of a 2 x 2 demagnetizing tensor. Asymmetries in Xyx could only be accounted for by postulating the existence of domains and/or inclusions in the sample. The polarized absorption spectrum of Cr (3+) in Li2Ge7O15 and the fluorescence lifetime in heavily doped ruby is reported. The general characteristics of the polarized spectrum of Cr (3+) in Li2Ge7O15 is presented in an energy level diagram. Uneven splittings of the R1 and R2 lines of ruby suggest the possibility of two inequivalent sites for the Cr (3 +) ion.
AD-666 676 HC$3.00 MF$0.65

ELECTRONIC COMPONENT OF THE THERMAL CONDUCTIVITY IN SEMICONDUCTORS.
Technical rept.,
Army Electronics Command Fort Monmouth N J
Irving N. Greenberg. Feb 68, 44p Rept no. ECOM-2932

Descriptors: (*Semiconductors, Transport properties), (*Thermal conductivity, Semiconductors), (*Electrical conductance, Semiconductors), Carriers (Semiconductors), Quantum statistics, Band theory of solids, Mobility, Impurities, Phonons, Interactions.

The report is a sequel to AD-651 229, dated February 1967. Here we discuss considerations pecu-

liar to semiconductors and semimetals, such as the influence of carrier concentration and degeneracy on the thermal conductivity and the Wiedemann-Franz-Lorenz law. The electronic component of thermal conductivity for an intrinsic semiconductor is discussed in terms of both electrons and holes. Following from this, the transport properties of an intrinsic semiconductor and the thermal resistance in semiconductors arising from free electrons are discussed in the light of previously developed theory. (Author)
AD-666 760 HC$3.00 MF$0.65

RARE EARTH INFRARED LIFETIMES AND EXCITON MIGRATION RATES IN TRICHLORIDE CRYSTALS.
Johns Hopkins Univ Baltimore Md Dept of Physics
For primary bibliographic entry see Field 7D.
AD-666 791 HC$3.00 MF$0.65

S-MATRIX THEORY OF LOCAL MOMENTS,
California Univ San Diego La Jolla
For primary bibliographic entry see Field 20J.
AD-666 844 Not available from CFSTI.

SIZE EFFECTS IN THE ELECTRONIC THERMAL CONDUCTIVITY OF GALLIUM SINGLE CRYSTALS,
Ohio State Univ Columbus Dept of Physics
For primary bibliographic entry see Field 20M.
AD-666 858 Not available from CFSTI.

POLARIZED NEUTRON DIFFRACTION STUDY OF ORDERED VFe.
Revised ed.,
Massachusetts Inst of Tech Cambridge
L. G. Feinstein, and D. P. Shoemaker. 7 Aug 67, 8p
AROD-3259:9
Contract DA-ARO (D)-31-124-G259
Revision of report dated 3 Apr 67.
Availability: Published in Journal of Physics and Chemistry of Solids, v29 p184-8 n.d.

Descriptors: (*Ferromagnetic materials, *Neutron diffraction analysis), (*Iron alloys, Magnetic moments), (*Vanadium alloys, Magnetic moments), Intermetallic compounds, Electrons, Spin, Band theory of solids.

In previous works values were obtained for the unpaired electron spins at both kinds of atomic sites in the ferromagnetic, nominally equiatomic alloy VFe. However, these results are subject to a very large uncertainty. The present paper describes a redetermination of the spin values of the atoms in this alloy by the polarized neutron technique, using a portion of the previously used polycrystalline block. With a least squares treatment of the four crystallographic reflections measured, and the newer experimental results for the iron spin density form factors, it was possible to obtain considerably more accurate results than those previously reported.
AD-666 869 Not available from CFSTI.

SPECTROSCOPIC INVESTIGATION OF GROUP-III ACCEPTOR STATES IN SILICON,
Purdue Univ Lafayette Ind Dept of Physics
A. Onton, P. Fisher, and A. K. Ramdas. 15 Nov 67, 22p
AROD-3655:34
Contract DA-31-124-ARO (D)-17
Availability: Published in The Physical Review, v163 n3 p686-703 Nov 15 1967.

Descriptors: (*Silicon, Crystal lattice defects), (*Crystal lattice defects, Line spectrum), Semiconductors, Impurities, Boron, Aluminum, Gallium, Indium, Excitation, Electron transitions, Band theory of solids, Ground state, Stresses.

The excitation spectra associated with the group-III acceptor impurities; boron, aluminum, gallium, and indium in silicon was studied at low temperatures using grating spectrometers. The behavior of these spectra under uniaxial stress was studied employing polarized radiation. The improved resolution of the present investigation revealed details not reported previously for the zero-stress spectra. The line reported by earlier workers at 68.26 meV for gallium impurity was resolved into three components at 67.95, 68.25, and 68.43 meV. For aluminum and indium impurity, the lines at 64.99 and 150.88 meV, respectively, were each resolved into two components, at 64.96 and 65.16 meV and at 150.80 and 151.08 meV, respectively. The presence of the shoulder at 39.91 meV on the excitation line of boron at 39.64 meV has been confirmed. Also, transitions from the ground state associated with the p3/2 valence band to excited states associated with the split-off p1/2 valence band have been observed for gallium and indium impurity, in addition to those of boron and aluminum reported previously. It was established that the ground state has Gamma-8 symmetry for all the impurities studied. The first three excited states participating in the optical transitions (corresponding to lines 1-3) also have Gamma-8 symmetry. The behavior of the line-4 complex under stress is consistent with the final states being Gamma-6 + Gamma-7 + Gamma-8. The stress-induced sublevels of the Gamma-8 final states of lines 1 and 2 have opposite ordering for compression along (111). The various states of a given impurity differ in their quantitative response to stress. (Author)
AD-666 874 Not available from CFSTI.

STRESS EFFECTS ON THE PARAMAGNETIC RESONANCE OF Yb (3+) IN ThO2 AND Ho (2+) IN CaF2,
California Univ Los Angeles Dept of Physics
For primary bibliographic entry see Field 7D.
AD-666 887 Not available from CFSTI.

SPECIFIC HEAT OF AU4V,
California Univ San Diego La Jolla Dept of Physics
For primary bibliographic entry see Field 20C.
AD-667 018 Not available from CFSTI.

FINITE TRANSLATIONS IN SOLID-STATE PHYSICS,
Massachusetts Inst of Tech Cambridge National Magnet Lab
For primary bibliographic entry see Field 20J.
AD-667 019 Not available from CFSTI.

CONVERGENCE STUDY OF A SELF-CONSISTANT ORTHOGONALIZED-PLANE-WAVE BAND CALCULATION FOR HEXAGONAL CdS,
Aerospace Research Labs Wright-Patterson AFB Ohio
R. N. Euwema, T. C. Collins, D. G. Shankland, and J. S. DeWitt. Feb 68, 8p
ARL-68-0007
Availability: Published in The Physical Review, v162 n3 p710-15 15 Oct 67.

Descriptors: (*Semiconductors, *Band theory of solids), (*Cadmium sulfides, Band theory of solids), Solid state physics, Brillouin zones, Mathematical models, Wave functions, Approximation (Mathematics), Convergence.

The electronic band structure of hexagonal CdS is calculated by means of a self-consistent orthogonalized-plane-wave model, using Slater's approximation for the exchange term. In order to determine the number of plane waves to be used in the Fourier expansion of the valence states, a convergence study is discussed for the starting model and for the final self-consistent model. It is concluded that the starting model is unsatisfactory from a convergence standpoint, while the self-consistent model has sufficiently well converged for 245 plane waves. The resulting band structure is presented for the high symmetry points of the Brillouin zone. The spin-orbit splitting of the top valence band and the effective mass along the c axis of the zone are calculated from this band structure. The results are then compared with experiment. (Author)
AD-667 022 Not available from CFSTI.

SCREENING OF A FIXED CHARGE IN BISMUTH METALS.
Doctoral thesis,
Utah Univ Salt Lake City Dept of Physics
D. H. Brownell, Jr., and E. H. Hygh. 13 Feb 68, 10p
AFOSR-68-0568
Grant AF-AFOSR-901-65
Research supported in part by NSF Grant.
Availability: Published in The Physical Review, v164 n3 p909-15 15 Dec 67.

Descriptors: (*Bismuth, Band theory of solids), Brillouin zones, Electron density, Impurities, Scattering, Solid state physics, Theses.

The screening-charge density and the potential matrix elements of a fixed charge in bismuth are calculated using a density-matrix approach. Numerical values of the charge density in the three principal crystal directions are obtained using the band parameters of Smith, Baraff, and Rowell. The resulting charge-density oscillations are interpreted on the basis of the band structure of bismuth. (Author)
AD-667 039 Not available from CFSTI.

MOTION OF THE VORTEX STRUCTURE IN TYPE-II SUPERCONDUCTORS IN HIGH MAGNETIC FIELD,
California Univ San Diego La Jolla Dept of Physics
For primary bibliographic entry see Field 20C.
AD-667 041 Not available from CFSTI.

INTERPRETATION OF URBACH'S RULE,
Rochester Univ N Y
D. L. Dexter. 11 Dec 67, 3p
AFOSR-68-0541
Grant AF-AFOSR-611-67
Availability: Published in Physical Review Letters, v19 n24 p1383-5 11 Dec 67.

Descriptors: (*Crystal lattices, Absorption spectrum), Electron transitions, Electric fields, Perturbation theory, Excitons, Color centers.
Identifiers: Urbach's rule.

A simple and general interpretation of Urbach's rule is presented, based only on harmonic vibrational motion and second-order perturbation theory.
AD-667 046 Not available from CFSTI.

SYMMETRY OF GROUND STATE IN A DILUTE MAGNETIC METAL ALLOY.
Yale Univ New Haven Conn Dept of Physics
For primary bibliographic entry see Field 20C.
AD-667 047 Not available from CFSTI.

SOME ELECTRICAL AND OPTICAL EFFECTS OF DISLOCATIONS IN SEMICONDUCTORS.
Doctoral thesis,
Illinois Univ Urbana
M. Meyer, M. H. Miles, and T. Ninomiya. 12 Jan 68, 7p
AFOSR-68-0586
Grant AF-AFOSR-803-65
Availability: Published in Journal of Applied Physics, v38 n11 p4481-6 Oct 67.

Descriptors: (*Semiconductors, Crystal lattice defects), Silicon, Germanium, Scattering, Electrical properties, Anisotropy, Resistance (Electrical), Absorption, Optical properties, Deformation, Spectrophotometers, Measurement, Electron microscopes, Photographs.

Optical measurements on silicon and germanium together with Hall measurements on germanium were performed on crystals containing predominantly edge or screw dislocation arrays. An apparent extended absorption tail in deformed germanium and silicon was found to depend markedly upon the direction of light propagation relative to the active slip planes. Photographs of the transmitted radiation through deformed silicon showed that the apparent extended absorption tail was due to strong anisotropic scattering from active slip planes. Hall measurements on sections from plastically deformed germanium are interpreted to give evidence of dislocation acceptors located in the lower half of the band gap. (Author)
AD-667 049 Not available from CFSTI.

QUANTUM SPECTROSCOPY OF THE LOW FIELD OSCILLATIONS OF THE SURFACE IMPEDANCE,
Maryland Univ College Park
For primary bibliographic entry see Field 20J.
AD-667 051 Not available from CFSTI.

SPIN POLARIZATION AROUND A LOCALIZED MAGNETIC IMPURITY IN A MAGNETIZED METAL.
Massachusetts Inst of Tech Cambridge National Magnet Lab
For primary bibliographic entry see Field 20C.
AD-667 061 Not available from CFSTI.

NUCLEAR QUADRUPOLE RESONANCE INVESTIGATION OF NdBr3 AND UI3.
Florida State Univ Tallahassee Dept of Physics
For primary bibliographic entry see Field 7D.
AD-667 062 Not available from CFSTI.

ELECTROABSORPTION OF ZINC TELLURIDE FILMS.
Revised ed.,
National Research Council of Canada Ottawa (Ontario) Div of Applied Physics
H. D. Riccius, and R. Turner. 22 Aug 67, 5p
NRC-9856
Revision of report dated 5 Jul 67.
Availability: Published in J. Phys. Chem. Solids, v29 p15-8 1968.

Descriptors: (*Semiconducting films, Absorption spectrum), (*Band theory of solids, Semiconducting films), Vapor plating, Vacuum apparatus, Carriers (Semiconductors), Plasma medium, Excitons, Electric fields, Zinc compounds, Tellurides.
Identifiers: Zinc telluride, Effective mass, Electroabsorption.

The effect of strong electric fields on the optical absorption edge of polycrystalline thin films of ZnTe has been investigated at room temperature, resulting in a quantitative determination of the reduced effective mass. Using the hole effective mass deduced from Hall measurements a value of approximately 0.16 m sub zero is obtained for the electron effective mass in ZnTe. (Author)
AD-667 068 Not available from CFSTI.

THE DEBYE TEMPERATURE OF NICKEL FROM 0 TO 300 DEGREES K.
Revised ed.,
Case Inst of Tech Cleveland Ohio
P. K. George, and Eric D. Thompson. 28 Feb 68, 9p
AFOSR-68-0558
Grant AF-AFOSR-857-65
Revision of report dated 4 May 67.
Availability: Published in Journal of Physics and Chemistry of Solids, v28 p2539-44 1967.

Descriptors: (*Nickel, *Specific heat), Band theory of solids, Ferromagnetic materials, Magnetic properties, Low-temperature research, Cryogenics, Interactions, Crystal lattices, Brillouin zones.
Identifiers: Debye temperature, Magnons, Spin waves, Lattice vibrations.

A new method of analysis of the specific heat data of ferromagnetic metals is applied to nickel. This method utilizes in a direct manner experimental results of the temperature-dependent saturation magnetization and thereby yields a more realistic estimate of the magnetic specific heat contribution than that obtained from a low temperature T to the three halves approximation. Based on this magnetic specific heat, an estimate of the lattice specific heat contribution is made. It is found that the Debye temperature agrees with that estimated by Rayne and Kemp for temperatures below 150 degrees Kelvin, but lies significantly higher in the range 200-300 degrees Kelvin. (Author)
AD-667 091 Not available from CFSTI.

RARE EARTH IMPURITIES IN II-VI COMPOUNDS.
Scientific interim rept.,
Texas Instruments Inc Dallas
R. Kent Watts, and William C. Holton. 13 Dec 67, 12p
AFOSR-68-0542
Contract F44620-67-C-0073
Availability: Published in Proceedings II-VI Semiconducting Compounds International Conference, N. Y. p1390-9 1967.

Descriptors: (*Semiconductors, *Crystal lattice defects), (*Rare earth elements, Electron spin resonance), Zinc sulfides, Zinc compounds, Cadmium compounds, Selenides, Tellurides, Cadmium selenides, Cadmium sulfides, Impurities, Erbium, Dysprosium, Neodymium, Ytterbium, Thulium, Ions, Crystal lattices.
Identifiers: Cadmium telluride, Zinc selenide, Zinc telluride.

The rare earth impurities Er (3+), Dy (3+), Nd (3+), Yb (3+), and Tm (2+) were observed by electron spin to occupy several different sites in II-VI compounds. The electron spin resonance (ESR) of rare earth impurities in the zinc and cadmium chalcogenides was studied to determine the atomic environment of the rare earth ion. This is accomplished by comparison of the low temperature ESR experimental results with the g factor calculated for each of the gamma-i levels of the crystal field-split ground state, thus distinguishing which gamma-i is lowest; then, assuming a point charge model for the crystal, determining the possible sites for which this gamma-i is lowest. The disadvantages of the point charge model are well known; nevertheless, the results of the model are found to be fairly accurate in the few cases where independent checks exist. (Author)
AD-667 094 Not available from CFSTI.

INTERFEROMETRIC EFFECT WITH SEMICONDUCTORS IN THE MILLIMETER-WAVE REGION,
Army Electronics Command Fort Monmouth N J Electronic Components Lab
H. Jacobs, G. Morris, and R. C. Hofer. Aug 67, 7p
Availability: Published in Journal of the Optical Society of America, v57 n8 p993-9 Aug 1967.

Descriptors: (*Semiconductors, Interference), (*Image converters, *Semiconductor devices), Millimeter waves, Amplitude modulation, Interferometers, Cathode ray tubes, Absorption, Display systems, Modulators.

The reflectance of millimeter waves has been studied for a planar arrangement of a semiconductor panel, an air space, and a metal reflector. For a given wavelength, by adjusting mechanical dimensions and material properties, we observed complete absorption. In these types of systems, changes of conductivity of the semiconductor panel resulted in variations of reflectance. New devices using this physical effect are suggested, such as a device for amplitude modulation of millimeter and submillimeter waves, a simplified interferometer, and an arrangement for conversion of millimeter- and submillimeter-wave images into visual displays. (Author)
AD-667 117 Not available from CFSTI.

QUANTUM OSCILLATIONS OF THE VELOCITY OF SOUND IN GALLIUM.
Scientific interim rept.,
Massachusetts Inst of Tech Cambridge National Magnet Lab
L. J. Neuringer, and Y. Shapira. 13 Mar 68, 5p
AFOSR-68-0600
Contract F44620-67-C-0047
Availability: Published in Physical Review, v165 n3 p751-4 Jan 68.

Descriptors: (*Gallium, *Ultrasonic properties), Single crystals, Magnetic fields, Absorption spectrum, Cryogenics, Attenuation, Band theory of solids, Phonons, Velocity.
Identifiers: *Quantum oscillations.

Large amplitude quantum oscillations of the ultrasonic velocity, the absolute value of (delta V/V sub o) is approximately equal to 0.001, were measured in single-crystal gallium at 1.2 degrees K < T < 1.6 degrees K in magnetic fields up to 150 kG. The measurements were carried out using 11- and 28-Mc/sec longitudinal sound waves with q parallel H parallel (b crystallographic axis). The experimental results are compared with three different theories of this phenomenon. The most satisfactory account of the experimental observations, including the amplitude of the velocity oscillations, is given by the Blank-Kaner theory, although some features of the data remain unexplained. (Author)
AD-667 160 Not available from CFSTI.

INTERBAND MAGNETO-OPTICAL ABSORPTION IN GALLIUM ARSENIDE,
Massachusetts Inst of Tech Cambridge National Magnet Lab
Q. H. F. Vrehen. 13 Mar 68, 15p
AFOSR-68-0601
Contract F44620-67-C-0047
Availability: Published in Journal of Physics and Chemistry of Solids, v29 p129-141 Jan 1968.

Descriptors: (*Semiconductors, Band theory of solids), (*Gallium arsenides, Band theory of solids), (*Magneto-optic effect, Gallium arsenides), Magnetic fields, Cryogenics, Absorption spectrum, Carriers (Semiconductors), Germanium, Magnetic fields, Excitons, Brillouin zones.
Identifiers: Effective mass.

Interband magneto-optical absorption measurements have been performed on GaAs in magnetic fields up to 98 kOe, for H parallel to (braces) 100 and (braces) 111 directions, and for sigma subscript +, sigma subscript minus and pi polarized radiation at 2 degrees K, 77 degrees K and room temperature. The transition energies, corrected for Coulomb binding effects, are analysed in terms of the theory developed for germanium by Roth et al. Apart from a slight anomaly in the energy of the a+ light hole level, the spectra are isotropic and do not show effects due to the lack of inversion symmetry in GaAs. At 77 degrees K the electron mass at the bottom of the band is found as m sub e = (0.067 plus or minus 0.002)m. For the light and heavy hole masses we arrive at m sub lh = (0.082 plus or minus 0.006)m, m sub hh = (0.45 plus or minus 0.05)m. The same values hold at 2 degrees K and slightly smaller values hold at room temperature.
AD-667 161 Not available from CFSTI.

LIGHT- INDUCED MODULATION OF ABSORPTION (LIMA) IN CADMIUM SULFIDE.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
K. W. Boer, and E. J. Conway. Mar 68, 11p
NASA-TN-D-4466
Contract 129-03-15-04-23

Descriptors: *Absorption spectra, *Crystal optics, *Lasers, *Light modulation, Cadmium sulfides, Single crystals.

For abstract, see STAR 06 09.
N68-18772 HC$3.00 MF$0.65

INVESTIGATION OF REFRACTORY DIELECTRICS FOR INTEGRATED CIRCUITS.
International Business Machines Corp., Cambridge, Mass.
V. Y. Doo, and D. R. Kerr. Mar 68, 81p NASA-CR-995
Contract NAS12-105
Coll- 81 P Refs

Descriptors: *Dielectrics, *Integrated circuits, *Pyrolytic materials, *Silicon nitrides, Deposition, Diodes, Passivity, Photoconductivity, Refractivity, Silicon dioxide, Transistors.

For abstract, see STAR 06 09.
N68-18849 HC$3.00 MF$0.65

RESEARCH ON DIGITAL TRANSDUCER PRINCIPLES, VOLUME 2 ANNUAL REPORT, 1 JAN. - 30 JUN. 1967.
Texas Univ., Austin. Electronic Materials Research Lab.
W. H. Hartwig. 30 Jun 67, 65p NASA-CR-93543, AR-1, V. 2
Contract NGR-44-012-043

Descriptors: *Dielectrics, *Polymer chemistry, *Thin films, *Vapor deposition, Digital techniques, Fabrication, Mathematical models, Photoelectricity, Polymers, Semiconductor devices, Titanium oxides, Transducers, Transport properties.

For abstract, see STAR 06 09.
N68-18931 HC$3.00 MF$0.65

SPIN-LATTICE INTERACTIONS OF IONS WITH UNFILLED F-SHELLS MEASURED BY ESR IN UNAXIALLY STRESSED CRYSTALS.
Rice Univ., Houston, Tex.
T. D. Black, and P. L. Donoho. 1965, 12p
NASA-CR-77668
Grant NSG-6
Subm- Submitted for Publication

Descriptors: *Absorption spectra, *Calcium fluorides, *Electron paramagnetic resonance, *Ions, *Spin-lattice relaxation, Axial stress, Crystals, Neodymium, Stress tensors, Tetragons, Uranium.

For abstract, see STAR 06 09.
N68-18955 HC$3.00 MF$0.65

DIPOLE MOMENT OF THE DOUBLE LAYER OF METALLIC SURFACES.
Moment Dipolaire de La Double Couche des Surfaces Metalliques
Techtran Corp., Glen Burnie, Md.
R. Garron. Mar 68, 3p NASA-TT-F-11591
Contract NASW-1695
Coll- 3 P Refs Tran- Transl. Into English From Compt. Rend. (Paris), V. 256, Mar. 1963 P 2346-2348
Descriptors: *Crystal surfaces, *Dipole moments, *Metal surfaces, *Surface layers, Electrons, Surface energy, Wave functions.

For abstract, see STAR 06 09.
N68-19025 HC$3.00 MF$0.65

CHARACTERISTICS OF TUNNELING P-N JUNCTIONS.
National Aeronautics and Space Administration. Electronics Research Center, Cambridge, Mass.
For primary bibliographic entry see Field 9A.
For abstract, see STAR 06 09.
N68-19062 HC$3.00 MF$0.65

THERMO-DIFFUSE ELECTRON SCATTERING IN ARSENIC, ANTIMONY AND BISMUTH CRYSTALS.
Thermisch-diffuse Elektronenstreuung in Arsen, Antimon Und Wismutkristallen
Osterreichische Studiengesellschaft Fur Atomenergie G.M.B.H., Seibersdorf (Austria).
E. M. Hoerl. 1967, 16p SGAE-M-13/1967
Lang- in German Conf- Presented At the German Assoc. for Electron Microscop. Symp., Marburg/Lahn, 17-21 Sep. 1967 Subm- Submitted for Publication

Descriptors: *Antimony, *Arsenic, *Bismuth, *Electron scattering, *Thermal diffusion, Crystal optics, Diffraction patterns, Electron diffraction, Electron diffusion, X ray diffraction.

For abstract, see STAR 06 09.
N68-19127 HC$3.00 MF$0.65

BEAM ALIGNMENT TECHNIQUES BASED ON THE CURRENT MULTIPLICATION EFFECT IN PHOTOCONDUCTORS THIRD SUMMARY TECHNICAL PROGRESS REPORT, 15 NOV. 1966 - 15 OCT. 1967.
General Precision, Inc., Little Falls, N. J. Materials Dept.
F. V. Allan, R. Carvalho, C. B. Ellis, D. Grafstein, and A. H. Samuel. 15 Nov 67, 53p NASA-CR-86035
Contract NAS12-8

Descriptors: *Beam currents, *Current density, *Germanium, *Photoconductors, *Single crystals, Infrared radiation, Mathematical models, Photoconductivity, Photoelectric emission, Photoelectric materials.

For abstract, see STAR 06 09.
N68-19129 HC$3.00 MF$0.65

AC LOSSES IN TYPE 2 SUPERCONDUCTORS.
Avco-everett Research Lab., Everett, Mass.
F. Di Salvo. Sep 66, 49p NASA-CR-61654, AMP-206
Contract NAS8-5279

Descriptors: *Electrical measurement, *Niobium compounds, *Niobium stannides, *Ohmic dissipation, *Superconductors, *Titanium compounds, *Zirconium compounds, Alternating current, Calorimeters.

For abstract, see STAR 06 09.
N68-19140 HC$3.00 MF$0.65

EFFECT OF SURFACE ROUGHNESS ON THE 0.66-MICRON NORMAL SPECTRAL EMITTANCE OF VAPOR-DEPOSITED RHENIUM FROM 1500 DEG K TO 2100 DEG K.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
P. Cipollone. Mar 68, 20p NASA-TM-X-1514
Contract 120-27-05-01-22

Descriptors: *Emission spectra, *Rhenium, *Surface roughness effects, *Vapor deposition, Emissivity, Line spectra, Reflectance, Surface roughness, Surface temperature, Thermionic emission.

For abstract, see STAR 06 09.
N68-19347 HC$3.00 MF$0.65

OXYGEN IN SILICON.
Kislorod V Kremnii
National Aeronautics and Space Administration, Washington, D. C.
S. S. Surkova. Mar 68, 7p NASA-TT-F-11556
Tran- Transl. Into English From the Publ. "fizicheskiye Svoystva Osobo Chistykh Metallov I Poluprovodnikov" Fan Press, Tashkent, 1966 P 118-124

Descriptors: *Admixtures, *Oxygen analyzers, *Semiconductor devices, *Silicon compounds, Electric potential, Gas analysis, Gaseous diffusion, Heat treatment.

For abstract, see STAR 06 09.
N68-19492 HC$3.00 MF$0.65

20M. Thermodynamics

BRILLOUIN SCATTERING IN CARBON DIOXIDE IN THE CRITICAL REGION,
Johns Hopkins Univ Baltimore Md Dept of Physics
Robert W. Gammon, H. L. Swinney, and Herman Z. Cummins. 25 Dec 67, 7p
AROD-5415:8
Contract DA-31-124-ARO (D)-400, ARPA Order-0675
Availability: Published in Physical Review Letters, v19 n26 p1467-9 Dec 1967.

Descriptors: (*Carbon dioxide, Phase studies), Thermal properties, Compressive properties, Sound transmission, Velocity, Attenuation, Coherent radiation, Lasers, Scattering, Polarization, Gases, Interferometers, Photomultipliers.
Identifiers: Brillouin scattering, Critical temperature.

In this report on observations of the Brillouin scattering spectrum of CO2 over a range of 0.2 to 6.0C above Tc (the critical temperature) on the critical isochore and 0.1 to 8.0C below Tc in the coexisting gas and liquid phases. The hypersonic velocities derived from the measured Brillouin shifts are compared with both observed and calculated low-frequency velocities. In addition, the observed relative intensities of the Rayleigh and Brillouin components provide new information on the critical divergence of the isothermal compressibility. (Author)
AD-666 636 Not available from CFSTI.

METHODS FOR MEASURING LARGE HEAT FLUXES,
Foreign Technology Div Wright-Patterson AFB Ohio
V. L. Sergeev. 19 Sep 67, 14p Rept no. FTD-HT-67-57
Edited trans. of Inzhenerno-Fizicheskii Zhurnal (USSR), v9 n4 p427-32 1965.

Descriptors: (*Heat flux, Measurement), Heat transfer, Heat transfer coefficients, Surface temperatures, Thermal conductivity, Calorimetry, Gases, USSR, Jets.
Identifiers: Translations.

A number of methods are used for measuring heat fluxes in high-temperature jets and shock tubes: the exponential, i.e., calorimetric method (according to the heat quantity stored in a sample); according to the surface temperature of a sample; the method of surface points (according to temperature change at the ends of a sample); according to the time interval before commencement of melting; the method of a cooled calorimeter (according to heating and consumption of cooled water). With the aid of the exponential method and a cooled calorimeter, distributions of heat fluxes in the cross-section of a high-temperature gas jet are measured. The results obtained by the two methods agree quite well. (Author)
AD-666 743 HC$3.00 MF$0.65

SIZE EFFECTS IN THE ELECTRONIC THERMAL CONDUCTIVITY OF GALLIUM SINGLE CRYSTALS,
Ohio State Univ Columbus Dept of Physics
Robert I. Boughton, and M. Yaqub. 15 Jan 68, 6p
AFOSR-68-0507
Grant AF-AFOSR-1051-66
Availability: Published in Physical Review Letters, v20 n3 p108-10 Jan 15 1968.

Descriptors: (*Gallium, *Thermal conductivity), Single crystals, Cryogenics, Electrons, Phonons, Interactions, Electrical conductance, Crystal lattices, Solid state physics.
Identifiers: Fermi surfaces.

Thermal conductivity measurements for 99.9999% gallium single crystals between 4.2

degrees K and 1.4 degrees K have shown that for heat flow along the B axis, gallium has the highest recorded conductivity of 845 watts per cm per degree kelvin for a solid. The results also indicate that thermal conductivity is mainly due to electron phonon collisions. (Author)
AD-666 858 Not available from CFSTI.

RADIATION COUPLED SHOCK LAYER INCLUDING UPSTREAM ABSORPTION EFFECTS.
Massachusetts Inst of Tech Cambridge Aerophysics Lab
For primary bibliographic entry see Field 22B.
AD-667 009 Not available from CFSTI.

SPECIFIC HEAT OF AU4V,
California Univ San Diego La Jolla Dept of Physics
For primary bibliographic entry see Field 20C.
AD-667 018 Not available from CFSTI.

A CHARACTERISTICS APPROACH TO RADIATION GASDYNAMICS,
Massachusetts Inst of Tech Cambridge Dept of Aeronautics and Astronautics
For primary bibliographic entry see Field 22B.
AD-667 097 Not available from CFSTI.

KINETIC THEORY OF TWO-TEMPERATURE PLASMAS,
Stanford Univ Calif
For primary bibliographic entry see Field 20I.
AD-667 130 Not available from CFSTI.

EXPERIMENTAL INVESTIGATION OF SUPERSONIC LAMINAR, TWO-DIMENSIONAL BOUNDARY-LAYER SEPARATION IN A COMPRESSION CORNER WITH AND WITHOUT COOLING.
California Inst of Tech Pasadena Graduate Aeronautical Labs
For primary bibliographic entry see Field 22B.
AD-667 163 Not available from CFSTI.

PLANCK FUNCTIONS AND INTEGRALS METHODS OF COMPUTATION.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
T. E. Michels. Mar 68, 39p NASA-TN-D-4446
Contract 188-48-01-99-51

Descriptors: *Black body radiation, *Numerical analysis, *Plancks constant, Computer programs, Electromagnetic spectra, Fortran, Intensity, Radiation laws, Schwartz inequality, Stefan-boltzmann law, Tables (data), Temperature, Wavelengths.

For abstract, see STAR 06 09.
N68-18455 HC$3.00 MF$0.65

EVALUATION OF THE THERMAL PROPERTIES OF MATERIALS. VOLUME 1 - TECHNICAL REPORT FINAL REPORT, 29 JUN. 1965 - 28 JUN. 1966.
Avco Corp., Lowell, Mass. Space Systems Div.
30 Jul 66, 107p NASA-CR-65979, AVSSD-0197-66-CR
Contract NAS9-4874

Descriptors: *Ablative materials, *Absorbers (materials), *Insulated structures, *Manned spacecraft, *Materials science, *Structural members, *Thermophysical properties, Adhesives, Materials tests, Sealers, Structural engineering.

For abstract, see STAR 06 09.
N68-18488 HC$3.00 MF$0.65

MARINER MARS ABSORPTIVITY STANDARD.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
For primary bibliographic entry see Field 22B.
For abstract, see STAR 06 09.
N68-18700 HC$3.00 MF$0.65

USE OF HIGH PURITY MATERIALS IN THERMOMETRY.
Zur Verwendung Der Reinststoffen in Der Thermometrie
National Aeronautics and Space Administration, Washington, D. C.
M. Richter. Mar 68, 12p NASA-TT-F-11548
Conf- Presented At the Intern. Symp. on Pure Mater. in Sci. and Technol., Dresden, 30 Nov. - 2 Dec. 1961

Descriptors: *Resistance thermometers, *Temperature measurement, *Thermocouples, Boiling, Gold, Oxygen, Platinum, Purity, Silver, Solidification, Sulfur, Thermodynamic equilibrium, Water, Zinc.

For abstract, see STAR 06 09.
N68-18813 HC$3.00 MF$0.65

EVALUATION OF THE THERMAL PROPERTIES OF MATERIALS. VOLUME 2 - DATA HANDBOOK FINAL REPORT, 29 JUN. 1965 - 28 JUN. 1966.
Avco Corp., Lowell, Mass. Space Systems Div.
For primary bibliographic entry see Field 22B.
For abstract, see STAR 06 09.
N68-18853 HC$3.00 MF$0.65

A CRITICAL EVALUATION OF THE USE OF ULTRASONIC ABSORPTION FOR DETERMING HIGH-TEMPERATURE GAS PROPERTIES.
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
W. F. Ahtye. Mar 68, 70p NASA-TN-D-4433
Contract 129-01-02-01-00-21

Descriptors: *Acoustic measurements, *Gas transport, *High temperature gases, *Ultrasonic tests, Argon, Gas density, Gas dynamics, Gas viscosity, Heat transfer, Hydrogen, Nitrogen, Oxygen, Range errors, Velocity errors.

For abstract, see STAR 06 09.
N68-18949 HC$3.00 MF$0.65

COOLDOWN TIME FOR SIMPLE CRYOGENIC PIPELINES.
National Bureau of Standards, Boulder, Colo. Cryogenics Div.
J. A. Brennan, R. V. Smith, and W. G. Steward.
23 Aug 67, 20p NASA-CR-91256
NASA ORDER R-45
Conf- Presented At the 10th Midwestern Mech. Conf., Ft. Collins, Colo., 21-23 Aug. 1967

Descriptors: *Cooling, *Cryogenic fluids, *Flow equations, *Pipelines, Boiling, Cryogenics, Gas flow, Heat transfer, Mathematical models, Temperature distribution.

For abstract, see STAR 06 09.
N68-19314 HC$3.00 MF$0.65

EXPERIMENTAL INVESTIGATION OF THERMAL STARTING PROCESS IN LIQUIDS OVER A HEATED HORIZONTAL PLATE.
Experimentelle Untersuchung des Thermischen Anlaufvorgangs in Fluessigkeiten Ueber Einer Beheizten Waagerechten Platte
Technische Hochschule Munchen (West Germany). Fakultaet Fuer Maschinenwesen Und Elektrotechnik.
K. Onat. 25 Jul 67, 95p
Lang- in German

Descriptors: *Convective heat transfer, *Flat plates, *Fluid boundaries, *Thermal boundary layer, Bibliographies, Convective flow, Heat flux, Heat generation, Prandtl number.
For abstract, see STAR 06 09.
N68-19318 HC$3.00 MF$0.65

A THERMOMETRIC FILM SIMULATOR AND AN APPLICATION TO THE FILM MOUNT OF THE ARCASONDE 1 A SENSOR PROGRESS REPORT.
Utah Univ., Salt Lake City. Dept. of Electrical Engineering.
For primary bibliographic entry see Field 4A.
For abstract, see STAR 06 09.
N68-19338 HC$3.00 MF$0.65

THE PUMPING SPEED FOR CARBON DIOXIDE BY THE ACTION OF A SURFACE COOLED BY LIQUID NITROGEN AT GAS TEMPERATURES RANGING FROM 136 DEG K TO 548 DEG K.
Untersuchungen des Saugvermoegens Einer Mit Fluessigem Stickstoff Gekuehlten Flaeche Fuer Kohlendioxid Bei Gastemperaturen Von 136 Deg K Bis 548 Deg K
National Aeronautics and Space Administration, Washington, D. C.
G. Saenger. Mar 68, 19p NASA-TT-F-11547, DVL-67-43
Tran- Transl. Into English From German Rept. Dvl-67-43, Jul. 1967

Descriptors: *Carbon dioxide, *Cryopumping, *Liquid nitrogen, *Surface cooling, Absorptivity, Condensates, Cryogenics, Surface reactions, Temperature gradients, Thermal conductivity.

For abstract, see STAR 06 09.
N68-19364 HC$3.00 MF$0.65

THE ESTIMATION OF HEAT OUTPUTS FOR ROAD HEATING INSTALLATIONS,
Road Research Lab., Crowthorne (England).
For primary bibliographic entry see Field 13B.
PB-177 713 HC$3.00 MF$0.65

STUDY OF THE EFFECTS OF ADDITIONAL ENDOGENOUS HEAT.
Thermo Electron Engineering Corp., Waltham, Mass.
For primary bibliographic entry see Field 6E.
PB-177 753 HC$3.00 MF$0.65

SOME AXISYMMETRICAL PROBLEMS OF THE THEORY OF HEAT CONDUCTIVITY WITH MIXED BOUNDARY CONDITIONS,
National Science Foundation, Washington, D. C. Special Foreign Currency Science Information Program.
Yu. N. Kuzmin. 1967, 16p SFCSI-Comm (TT-67-59054)
Trans. of Zhurnal Tekhnicheskoi Fiziki (USSR) v36 n2 p230-8 1966.

Descriptors: (*Surface temperatures, Mathematical prediction), Walls, Boundary layer, Thermal stability, Mathematical analysis, Elasticity, Thermal insulation.
Identifiers: Axisymmetrical problems, Mixed boundary conditions, Dual equations, Translations.

This paper analyzes, by the method of dual integral equations, some axisymmetrical problems of the theory of heat conductivity, for the layer on one of the boundaries on which there exists a circular contour separating the boundary conditions. (Author)
TT-67-59054 HC$3.00 MF$0.65

20N. Wave Propagation

TABLES OF E (h,z), C (h,z), S (h,z),
Harvard Univ., Cambridge, Mass. Cruft Lab.
For primary bibliographic entry see Field 9F.
AD-253 464 HC$3.00

BIBLIOGRAPHY OF AFCRL PUBLICATIONS FROM 1 JULY 1966 TO 30 SEPTEMBER 1967.
Air Force Cambridge Research Labs L G Hanscom Field Mass
For primary bibliographic entry see Field 5B.
AD-666 664 HC$3.00 MF$0.65

A MODIFIED RESIDUE CALCULUS TECHNIQUE.
Interim rept.,
Illinois Univ Urbana Antenna Lab
R. Mittra, S. W. Lee, and G. F. VanBlaricum, Jr.
Jan 68, 34p Rept nos. TR-15, UIAL-68-1
AFCRL-68-0079
Contract AF 19 (628)-3819
See also Technical report no. 13, AD-665 879.

Descriptors: (*Electromagnetic fields, Boundary value problems), Meromorphic functions, Integral equations, Complex variables, Iterative methods, Electromagnetic wave reflections, Dielectric properties, Waveguides, Propagation.
Identifiers: Asymptotic solutions, Wiener-Hopf technique.

A modified residue-calculus technique is presented for the solution of a class of infinite sets of equations which typically arise in the boundary value problems involving modifications of basic Wiener-Hopf geometries. The central step in this method is the construction of a meromorphic function f (w) satisfying both certain criteria determined by the form of the infinite set of equations and an auxiliary requirement imposed by the edge condition. The solution is constructed by integrating certain functions related to f (w) in the complex w-plane. The special features of the method are: (i) No matrix inversion is necessary. (ii) The iterative procedure used to find the zeros of f (w) has a built-in convergence check based on a priori knowledge of the asymptotic behavior of the fields. (iii) Satisfaction of the edge condition is guaranteed. This method makes possible very accurate solutions to problems for which only solutions based on variational, quasi-static, or numerical means are available at the present time. A typical example of a waveguide discontinuity is included to illustrate the use of the method. (Author)
AD-666 670 HC$3.00 MF$0.65

THE RADIO EMISSIONS FROM CLOSE LIGHTNING,
Stanford Research Inst Menlo Park Calif
For primary bibliographic entry see Field 4A.
AD-666 711 Not available from CFSTI.

SMITH-PURCELL RADIATION FROM A NARROW TAPE HELIX.
Illinois Univ Urbana
For primary bibliographic entry see Field 20F.
AD-666 866 Not available from CFSTI.

OXYGEN ABSORPTION IN THE BAND FROM 53.4 TO 56.4 GHz.
Rept. for Dec 64-Oct 67,
Aerospace Corp El Segundo Calif Lab Operations
C. J. Carter, R. L. Mitchell, and E. E. Reber. Oct 67, 61p Rept no. TR-0158 (3110-01)-2
SAMSO-TR-68-103
Contract F04695-67-C-0158

Descriptors: (*Oxygen, Absorption spectrum), (*Electromagnetic waves, Absorption), Radiometers, Calibration, Performance (Engineering), Attenuation, Millimeter waves, Atmosphere, Statistical analysis.

The report summarizes the findings of an extensive study (December 1964 through June 1967) of the phenomenon of absorption of electromagnetic energy in the atmosphere by oxygen. Purpose of the study was to make sufficient measurements in the oxygen absorption spectrum (50 to 70 GHz) to confirm or refine the existing theory as necessary. New values for the Van Vleck line broadening coefficients have been calculated, based on 1500 independent attenuation measurements made over a slant range from space to various altitudes in the atmosphere, on a frequency range of 53.4 to 56.4 GHz and an altitude range from 0 to 45,000 ft (14.75 km). The average relative error between the measured and the calculated attenuation is 8.6 percent. A similar comparison based on Meeks and Lilley's line broadening coefficients yielded an average relative error of 13 percent. (Author)
AD-666 916 HC$3.00 MF$0.65

ON THE 'PHYSICAL REALITY OF ELECTROMAGNETIC POTENTIALS,'
Brandeis Univ Waltham Mass Dept of Physics
For primary bibliographic entry see Field 20C.
AD-667 015 Not available from CFSTI.

INSTRUCTION MANUAL FOR IONOSPHERIC DRIFT MEASUREMENTS. THE DETERMINATION OF IONOSPHERIC DRIFTS FROM THREE-RECEIVER FADING RECORDS.
Adelaide Univ. (Australia). Dept. of Physics.
For primary bibliographic entry see Field 4A.
For abstract, see STAR 06 09.
N68-18905 HC$3.00 MF$0.65

REPORT OF NRL PROGRESS.
Naval Research Lab., Washington, D. C.
For primary bibliographic entry see Field 8B.
PB-177 727 HC$3.00 MF$0.65

21. PROPULSION AND FUELS

21B. Combustion and Ignition

THE INFLUENCE OF CHEMICAL INHIBITOR ADDITION ON REVERSE-JET FLAME STABILIZATION,
Tulane Univ New Orleans La Dept of Mechanical Engineering
L. Bellamy, G. H. Barron, and J. R. O'Loughlin. 1968, 8p
AROD-4981:2
Contract DA-31-124-ARO (D)-240
Prepared for presentation at the Gas Turbine Conference and Products Show, Washington, D. C., March 17-21, 1968.
Availability: Published in ASME Publication, n68-GT-39 p1-4 1968.

Descriptors: (*Jet flames, Stabilization), Hydrocarbons, Combustion, Additives, Chlorine, Bromine, Reaction kinetics.
Identifiers: Reverse-jet flames.

Flame stability limits produced by a reverse-jet flameholder are experimentally studied with a chemical inhibitor added to the gas stream issuing from the reverse-jet. The result of this addition is a reduction of flame stability limits. Such a reduction indicates the importance of the chemical rate processes in the flameholding phenomenon. (Author)
AD-666 878 Not available from CFSTI.

SOME FUNDAMENTALS OF COMBUSTION INSTABILITY,
Massachusetts Inst of Tech Cambridge Dept of Mechanical Engineering
For primary bibliographic entry see Field 21H.
AD-667 137 Not available from CFSTI.

A NEW APPLICATION OF PERFECTLY STIRRED REACTOR (P.S.R.) THEORY TO DESIGN OF COMBUSTION CHAMBERS.
Technical rept.,
Pennsylvania State Univ., University Park. Dept. of Fuel Science.
Robert H. Essenhigh. Mar 67, 87p FS67-1 (U)
Contract Nonr-656 (29)

Descriptors: (*Fuel injectors, *Combustion chambers), (*Fuel sprays, Combustion), (*Combustion chamber gases, Combustion), Flame holders, Plug nozzles, Exhaust nozzles, Jet mixing flow, Vortices, Burning rate, Turbulence, Configuration, Stabilization systems, Liquid rocket fuels. Solid rocket fuels, Hybrid rocket propellants, Flame propagation, Pressurization, Fans, Ignition, Hypergolic ignition.
Identifiers: Grids, PSR (Perfectly stirred reactors), Burn out velocity.

The chief requirement for combustion chamber design is a guarantee of ignition. This guarantee, it was suggested by Bragg 15 years ago, can best be met by formation of a perfectly stirred reactor (P.S.R.) section at the burner location of a combustion chamber. This proposition is now proved formally in this report by considering representation of a plane or plug-flow flame by a sequence of P.S.R.'S. It is then shown that, in the region before ignition, a faster rate of temperature rise is achieved by progressively increasing the size and reducing the number of reactors, with a limit of one single large one for the whole of the ignition section. Conversely, it is shown that faster burn out after ignition is achieved by the opposite, that is by a reversion from perfect stirring to plug flow. (Author)
AD-812 114 HC$3.00 MF$0.65

HETEROGENEOUS IGNITION OF METALS - MODEL AND EXPERIMENT FINAL REPORT, 1 MAY 1966 - 31 OCT. 1967.
Princeton Univ., N. J. Dept. of Aerospace and Mechanical Sciences.
A. M. Mellor. 1967, 382p NASA-CR-93541, REPT.-816
Grant NSG-641

Descriptors: *Combustion physics, *Ignition temperature, *Solid propellant ignition, *Solid rocket propellants, Flames, Gas-metal interactions, Literature, Metal combustion, Propellant combustion, Rocket oxidizers.

For abstract, see STAR 06 09.
N68-18929 HC$3.00 MF$0.65

INVESTIGATION OF THE PECULARITIES OF PRE-FLAME PROCESSES AND IGNITION OF HYDROCARBONS OF VARIOUS STRUCTURES. PART 1 - VARIATION OF COOL FLAME DELAY AND IGNITION DELAY WITH COMPRESSION TEMPERATURE AND PRESSURE.
Shell Research, Ltd., Chester (England). Thornton Research Center.
D. I. Skorodelov, and A. N. Voinov. 1967, 17p Tran- Transl. Into English From Kinetika I Kataliz (USSR), V. 8, No. 2, 1967 P 252-260 Seri- Its Transl. No. 1137

Descriptors: *Adiabatic conditions, *Flame propagation, *Flash point, *Hydrocarbons, *Pressure effects, *Temperature effects, Automobiles, Butenes, Cyclic hydrocarbons, Delay, Fuel systems, Gas mixtures, Hexenes, Ignition limits, Octanes, Paraffins, Stoichiometry.

For abstract, see STAR 06 09.
N68-19175 HC$3.00 MF$0.65

PRODUCING HOLOGRAMS OF REACTING SPRAYS IN LIQUID PROPELLANT ROCKET ENGINES, PHASE 1 INTERIM REPORT, 1 AUG. 1967 - 7 FEB. 1968.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. TRW Systems, Redondo Beach, Calif.
For primary bibliographic entry see Field 21H.

For abstract, see STAR 06 09.
N68-19439 HC$3.00 MF$0.65

IGNITION KINETICS OF THE CARBON MONOXIDE-OXYGEN REACTION.

National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
R. S. Brokan. 1966, 25p NASA-TM-X-52196
Presented At the 11th Intern. Symp. on Combust., Berkeley, Calif., 14-20 Aug. 1966 Spon- Sponsored By the Combustion Inst.

Descriptors: *Carbon monoxide, *Ignition, *Oxygen, *Reaction kinetics, Hydrogen, Numerical analysis, Oxidation, Reaction time, Water vapor.

For abstract, see STAR 06 09.
N68-19445 HC$3.00 MF$0.65

NONLINEAR COMBUSTION INSTABILITY IN LIQUID PROPELLANT ROCKET MOTORS.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. Mathematical Applications Group, Inc., White Plains, N. Y.
For primary bibliographic entry see Field 21H.
For abstract, see STAR 06 09.
N68-19448 HC$3.00 MF$0.65

21C. Electric Propulsion

CHARGED COLLOIDAL SIZED PARTICLES FOR PROPULSION.
Final rept.,
Illinois Univ Urbana Charged Particle Research Lab
C. D. Hendricks. 31 Jan 68, 14p Rept no. CPRL-1-68
AFOSR-68-0527
Grant AF-AFOSR-107-66

Descriptors: (*Ion engines, Scientific research), Colloids, Charged particles, Electric propulsion, Sprays, Electrostatics, Viscosity, Surface tension, Secondary emission, Gravity, Mass transfer, Stability, Liquid jets, Acceleration, Electric fields.
Identifiers: *Colloid engines, Electrostatic spraying.

A review of research results is given in the fields of electrostatic spraying, and control of fluids in accelerated and low gravity environment.
AD-666 688 HC$3.00 MF$0.65

HIGH-SPEED INDUCTION MOTOR SIMULATION.
Research rept. Aug 66-Aug 67,
Army Mobility Equipment Research and Development Center Fort Belvoir Va
Melvin L. Goss. Feb 68, 52p Rept no. USAMERDC-1920

Descriptors: (*Electric propulsion, *Induction motors), Simulation, Analog computers, Equations, Textbooks, Feedback amplifiers, Torque, Velocity, Power, Vehicles, Electric currents, Programming (Computers), Mathematical models.
Identifiers: Graphs (Charts), Computer analysis.

Covers a study on a simulation of a 50-horsepower high-speed induction motor on an analog computer. The investigations described in the report are intended to accomplish several purposes. One purpose is to develop in more detail the simulation equations from the dynamic equations provided on induction motors in recent machinery textbooks. A second purpose is to illustrate the determination of per-unit and amplitude scaled equations, and the calculation of potentiometer and amplifier gains. Another purpose is to record in detail the induction motor variables simulated for assistance and comparison in performing future work in this area of simulation. The results of this induction motor simulation provide a base from which to approach more complex control and application simulations which contain the induction motor as a component such as proposed electrical propulsion systems for various land vehicles. (Author)
AD-666 762 HC$3.00 MF$0.65

FUEL CELL-ELECTRIC PROPULSION TEST RIG (MODIFIED M-37, 3/4-TON CARGO TRUCK).
Army Mobility Equipment Research and Development Center Fort Belvoir Va
For primary bibliographic entry see Field 10B.
AD-666 763 HC$3.00 MF$0.65

POWER SOURCES FOR ELECTRIC CARS.
Army Electronics Command Fort Monmouth N J
For primary bibliographic entry see Field 10B.
AD-666 773 HC$3.00 MF$0.65

CHARGE-TO-MASS RELATIONSHIPS FOR ELECTROHYDRODYNAMICALLY SPRAYED LIQUID DROPLETS.
Scientific interim rept.,
Illinois Univ Urbana
Robert J. Pfeifer, and Charles D. Hendricks. 5 Mar 68, 8p
AFOSR-68-0547
Grant AF-AFOSR-107-66
Availability: Published in Physics Fluids, v10 n10 p2149-54 1967.

Descriptors: (*Drops, Charged particles), Sprays, Hydrodynamics, Electrical properties, Particle size, Liquids, Probability, Functional analysis, Energy, Glycerols, Phthalates, Bismuth alloys, Lead alloys.
Identifiers: Wood's metal, Electrohydrodynamic spraying, *Charge-to-mass ratio, Octoil.

From a mathematical model suggested by Vonnegut and Neubauer, relationships between droplet radius and charge to mass ratio are developed for electrohydrodynamically sprayed liquid particles. Under the assumption that an unstable liquid mass disrupts into equally sized and charged particles so that the system energy tends toward a minimum value, probability distributions of the charge-to-mass ratio and the droplet radius are derived as modified Maxwell-Boltzmann functions; such functions explain certain features of experimentally observed distributions. That charged droplet systems tend toward a minimum energy configuration is verified by experimental evidence for Wood's metal, octoil, and glycerine. (Author)
AD-666 998 Not available from CFSTI.

INVESTIGATION OF PLASMA ROTATION IN PULSED INDUCTIVE ACCELERATOR.
TRW Systems Redondo Beach Calif
C. L. Dailey. 29 Feb 68, 11p
AFOSR-68-0546
Contract AF 49 (638)-1210
Availability: Published in AIAA 6th Aerospace Sciences Meeting, 22-24 January p1-8 1968, paper no. 68-86.

Descriptors: (*Plasma accelerators, Rotation), (*Plasma engines, Plasma accelerators), Magnetic pinch, Pulse systems, Gas ionization, Magnetohydrodynamics, Electron density, Electric currents, Argon, Kinetic energy, Azimuth.

The paper describes an experimental investigation of the plasma properties in the accelerating current layer of a pulsed inductive plasma accelerator. Current from an initially charged capacitor passing through a flat spiral coil produces ionization and snowplow acceleration in argon at 1 torr pressure and room temperature without preionization. The plasma current layer forms in a thin disc increasing in intensity to a maximum of about 15 kiloamps/sq cm after 0.2 microsecond. It then splits into two layers of reduced amplitude producing a rounded shoulder on the corresponding magnetic field distribution. The plasma motion is calculated from electron density, and electric and magnetic field measurements. There is an azimuthal velocity component showing that ions carry a substantial fraction of the total current in both the current layers. The axial motion represents a kinetic energy on the order of 40 percent of the work done on the plasma by the accelerator coil during the first 0.6 microsecond of the first quarter-cycle at an average 1 sub sp of 1500 seconds. (Author)
AD-667 099 Not available from CFSTI.

EXPERIMENTAL PERFORMANCE OF A LOW-THRUST, DIVERGENT-FLOW, CONTACT-IONIZATION ELECTROSTATIC THRUSTOR.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
W. C. Lathem, and J. F. Staggs. 1966, 26p
NASA-TM-X-52194
Conf- Presented At the 2d Propulsion Joint Specialist Conf., Colorado Springs, 13-17 Jun. 1966

Descriptors: *Electrostatic engines, *Ion engines, *Satellite attitude control, *Stationkeeping, Cesium, Ionization, Low thrust, Positioning, Thrust vector control, Tungsten.

For abstract, see STAR 06 09.
N68-18820 HC$3.00 MF$0.65

VEHICLE ATTITUDE DETERMINATION WITH A SINGLE ONBOARD CAMERA.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
For primary bibliographic entry see Field 17G.
For abstract, see STAR 06 09.
N68-19275 HC$3.00 MF$0.65

21E. Jet and Gas Turbine Engines

ANNUAL CONFERENCE ON WEATHER EFFECTS ON AIRCRAFT SYSTEMS (2ND). A COMPILATION OF THE PAPERS PRESENTED SEPTEMBER 18 AND 19, 1962.
Naval Air Turbine Test Station, Trenton, N. J. Aeronautical Turbine Lab.
For primary bibliographic entry see Field 4B.
AD-461 803 HC$3.00

CONFERENCE ON ENVIRONMENTAL EFFECTS ON AIRCRAFT PROPULSION (1ST). A COMPILATION OF THE PAPERS PRESENTED JUNE 22 AND 23, 1961.
Naval Air Turbine Test Station, Trenton, N. J. 1961, 238p

Descriptors: (*Turbojet engines, Environmental tests), Symposia, Wind tunnel models, Meteorological phenomena, Simulations, Laboratory equipment, Test equipment, Test methods, Raindrops, Spectrum analyzers, Birds, Hazards, Gas turbines, De-icing systems, Salt spray tests, Corrosion inhibition, Naval research, Reports, Ingestion (Engines), High-temperature research, Low-temperature research, Ice, Water, Flight tests, Sea water, Reviews.
Identifiers: J-79 engines, J-57 engines, F-8 aircraft, F-3 aircraft, T-38 aircraft, T-39 aircraft.

Contents: Producing weather for turbojet engine testing; some problems encountered in establishing a small engine icing facility at the AEL, NAMC; the photoelectric raindrop-size spectrometer; measuring techniques under water and icing conditions; a comparison between the rotating multicylinder method and the oil slide method; national severe storms project - objectives and operations; severe weather flight testing of jet fighter airplanes and engines; foreign object ingestion in turbine engines; icing trials of the T-38 and T-39 aircraft; icing tests conducted at NATTS, May 1960 through May 1961; a resume of simulation techniques and icing activities at the engine laboratory of the National Research Council (Canada); the effects of bird ingestion on gas turbine engines; effects of water ingestion on turbojet engine operation; salt water ingestion by gas turbine engines; the effect of temperature extremes upon the operational characteristics of turbojet engines.
AD-461 804 HC$3.00

POWER MACHINERY MANUFACTURE, NO. 1, 1966. SELECTED ARTICLES.
Foreign Technology Div Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 10A.
AD-666 739 HC$3.00 MF$0.65

INVESTIGATION OF COORDINATED FREE TURBINE ENGINE CONTROL SYSTEMS FOR MULTIENGINE HELICOPTERS.
General Motors Corp Indianapolis Ind Allison Div
For primary bibliographic entry see Field 1C.
AD-666 796 HC$3.00 MF$0.65

PRELIMINARY DESIGN OF AN ADVANCED EXHAUST GAS DIVERTER.
Final rept.,
Solar San Diego Calif
Albert Mierlot. Dec 67, 179p Rept no. Solar-ER-1856
USAAVLABS-TR-67-69
Contract DA-44-177-AMC-433 (T)

Descriptors: (*Gas turbines, Exhaust valves), (*Exhaust valves, Pneumatic valves), Turbine parts, Butterfly valves, Design, Gas generating systems, Performance (Engineering), Exhaust gases, Reliability, Gas flow, Manufacturing methods, Stresses, Structural properties, Thermal analysis.
Identifiers: *Diverter valves.

The report contains results of a design study program for an advanced device for the diversion of high energy gas generator turbine discharge gases. Numerous concepts of such devices were initiated during the preliminary period. Evaluation of these concepts resulted in the selection of two design approaches for further design studies. One design, a basic butterfly valve, embodies significant improvements over the current type. The second design represents a unique concept which uses a rotating elbow enclosed within a housing to achieve gas flow diversion. An analysis and comparison of the two designs brought about the selection of the butterfly approach for the preparation of a final design and for the preparation of manufacturing drawings. A manufacturing plan describing the processes and methods which would be required to fabricate a prototype version of the butterfly valve is included. (Author)
AD-666 803 HC$3.00 MF$0.65

HYDROJET DUCTED PROPULSION SYSTEM - IMPELLER INDUCED VIBRATORY PRESSURES AND PERFORMANCE CHARACTERISTICS FINAL REPORT, 1 SEP. 1964 - 30 NOV. 1966.
Adelaide Univ. (Australia). Dept. of Mechanical Engineering.
For primary bibliographic entry see Field 13J.
For abstract, see STAR 06 09.
N68-18320 HC$3.00 MF$0.65

EXPERIMENTAL PERFORMANCE EVALUATION OF AN 8.5 INCH (21.59 CM) MEAN-DIAMETER AXIAL FLOW TURBINE AT REYNOLDS NUMBERS FROM 18,000 TO 177,000.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
For primary bibliographic entry see Field 1A.
For abstract, see STAR 06 09.
N68-18501 HC$3.00 MF$0.65

ANALYTICAL INVESTIGATION OF SUPERSONIC TURBOMACHINERY BLADING. I - COMPUTER PROGRAM FOR BLADING DESIGN.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
L. J. Goldman, and V. J. Scullin. Mar 68, 66p NASA-TN-D-4421
Contract 128-31-02-25-22

Descriptors: *Compressor blades, *Computer programs, *Structural design, *Supersonic turbines, *Turbomachinery, Fortran, Gas flow, Mach number, Numerical analysis, Vortices.

For abstract, see STAR 06 09.
N68-18620 HC$3.00 MF$0.65

DEVELOPMENT OF A SHORT-LENGTH TURBOJET COMBUSTOR SUMMARY REPORT, 3 JUN. 1965 - 18 APR. 1967.
Pratt and Whitney Aircraft, West Palm Beach, Fla. Research and Development Center.
D. L. Kitts. 18 Mar 68, 302p NASA-CR-54560, PWA-FR-2433
Contract NAS3-7905

Descriptors: *Combustion chambers, *Fuel injection, *Gas turbines, Combustion physics, Fuel sprays, High temperature tests, Performance tests, Pressure distribution, Supersonic flow, Temperature profiles.

For abstract, see STAR 06 09.
N68-18974 HC$3.00 MF$0.65

FULL SCALE TURBOFAN DUCT BURNER TEST PROGRAM FINAL REPORT, 29 JUN. 1965 - 30 JUN. 1967.
Pratt and Whitney Aircraft, West Palm Beach, Fla. Research and Development Center.
C. J. Clapp. 18 Mar 68, 260p NASA-CR-54637, PWA-FR-2542
Contract NAS3-7907

Descriptors: *Ducted fans, *Performance tests, *Scale models, *Structural stability, *Supersonic combustion ramjet engines, Aerodynamic configurations, Burners, Flight simulation, Supersonic transports, Turbomachinery.

For abstract, see STAR 06 09.
N68-19070 HC$3.00 MF$0.65

CONSIDERATIONS OF TURBINE COOLING SYSTEMS FOR MACH 3 FLIGHT.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
F. S. Stepka. Apr 68, 43p NASA-TN-D-4491
Contract 720-03-51-05-22

Descriptors: *Air flow, *Compressors, *Engine coolants, *Gas turbines, *Temperature control, *Temperature distribution, Air intakes, Airfoils, Cooling, Heat exchangers, Heat transfer, Supersonic flight.

For abstract, see STAR 06 09.
N68-19187 HC$3.00 MF$0.65

PROPULSION SYSTEM DYNAMIC SIMULATION THEORY AND EQUATIONS.
North American Aviation, Inc., Los Angeles, Calif.
A. W. Martin. Mar 68, 222p NASA-CR-928, NA-67-384
Contract NAS2-3268
Coll- 222 P Refs

Descriptors: *B- 70 aircraft, *Computerized simulation, Aeronautical engineering, Air flow, Aircraft design, Boundary layer control, Control, Digital computers, Dynamic characteristics, Engine inlets, Flow characteristics, Pressure reduction.

For abstract, see STAR 06 09.
N68-19273 HC$3.00 MF$0.65

21H. Rocket Motors and Engines

INVESTIGATION OF A TWO-DIMENSIONAL FULLY STALLED TURBULENT FLOW FIELD,
Stanford Univ Calif Thermosciences Div
Granger Chui, and Stephen J. Kline. Aug 67, 178p Rept no. MD-19
AFOSR-67-2047
Contract AF-49 (638)-1278

Descriptors: (*Exhaust diffusers, *Flow separation), Two-dimensional flow, Turbulence, Stalling, Flow fields, Pressure, Velocity, Boundary layer, Equations of motion, Nozzle gas flow, Nozzle throats.
Identifiers: Bistable flow.

The bistable, steady, turbulent separation phenomenon observed in a two-dimensional fully-stalled diffuser is studied. Detailed mean flow data including pressure, dissipation and velocity (both magnitude and direction) inside the flow field as well as development of boundary layers on both side walls are reported for cases with thin and thick boundary layers at inlet and with and without fairing curves at the throat. For all cases, most important changes in flow data occur in a region within two inlet widths up and downstream of the throat. Pressure gradients in this region are so large that the boundary layer on the unstalled side changes shape abruptly while the layer on the stalled side separates in the vicinity of the throat. Streamline patterns are obtained from the velocity distributions. The location of the dividing streamline is different for the different cases. Based on the dividing streamline, a displacement line is defined to extend the concept of displacement thickness to the free shear layer which is developed from the separated boundary layer. This displacement line together with the loci of boundary layer displacement thicknesses on the solid walls form an effective channel. The shape and area ratio of this effective channel explain the different trends of pressure distributions in the main flow. (Author)
AD-666 931 HC$3.00 MF$0.65

SOME FUNDAMENTALS OF COMBUSTION INSTABILITY,
Massachusetts Inst of Tech Cambridge Dept of Mechanical Engineering
Richard F. Salant, and Tau-Yi Toong. 19 Mar 68, 24p
AFOSR-68-0630
Contract AF 49 (638)-1354
Availability: Published in Oxidation and Combustion Reviews, v2 p185-206 1967.

Descriptors: (*Rocket motors, Combustion), (*Combustion, Stability), Acoustic properties, Mechanical waves, Interactions, Flow fields, Aerodynamic noise, Oscillation, Transport properties, Distortion, Sources, Vortices, Energy.
Identifiers: *Combustion instability.

Combustion instability is examined from a fundamental viewpoint to determine if mechanisms other than those previously proposed for this phenomenon are possible. Such examination reveals that while almost all proposed mechanisms are based on interactions due to oscillatory mass/energy sources, flow-field interactions can also cause instability. In particular, energy transport to the acoustic mode from a steady flow field (as demonstrated by a simple theoretical analysis) and from non-acoustic fluctuating flow-field modes (as demonstrated by research in other fields), are possible sources of combustion instability. (Author)
AD-667 137 Not available from CFSTI.

A NEW APPLICATION OF PERFECTLY STIRRED REACTOR (P.S.R.) THEORY TO DESIGN OF COMBUSTION CHAMBERS.
Pennsylvania State Univ., University Park. Dept. of Fuel Science.
For primary bibliographic entry see Field 21B.
AD-812 114 HC$3.00 MF$0.65

HETEROGENEOUS IGNITION OF METALS - MODEL AND EXPERIMENT FINAL REPORT, 1 MAY 1966 - 31 OCT. 1967.
Princeton Univ., N. J. Dept. of Aerospace and Mechanical Sciences.
For primary bibliographic entry see Field 21B.
For abstract, see STAR 06 09.
N68-18929 HC$3.00 MF$0.65

THERMODYNAMIC IMPROVEMENTS IN LIQUID HYDROGEN TURBOPUMPS INTERIM REPORT, 17 JUN. 1966 - 17 JUN. 1967.
Rocketdyne, Canoga Park, Calif.
W. R. Wagner, and G. S. Wong. Jul 67, 327p NASA-CR-93540, R-7138
Contract NAS8-20324

Descriptors: *Liquid hydrogen, *Thermodynamic properties, *Turbine pumps, Bibliographies, Cryogenic rocket propellants, Flow velocity, Heat

transfer coefficients, Liquid rocket propellants, Production engineering, Thermal insulation, Thermal protection.

For abstract, see STAR 06 09.
N68-19048 HC$3.00 MF$0.65

PERFORMANCE ANALYSIS OF COMPOSITE PROPULSION SYSTEMS, PHASE 1 FINAL REPORT, 30 DEC. 1966 - 29 DEC. 1967.
Rocketdyne, Canoga Park, Calif.
J. A. Wrubel. Jan 68, 55p NASA-CR-93548, R-7346
Contract NAS7-521

Descriptors: *Gas streams, *Propellant combustion, *Propulsion system performance, *Turbulent mixing, Combustion chambers, Control boards, Exhaust nozzles, Experimental design, Hydrogen, Hypergolic rocket propellants, Liquid oxygen, Shear flow, Test equipment.

For abstract, see STAR 06 09.
N68-19123 HC$3.00 MF$0.65

EXPERIMENTAL INVESTIGATION OF VAPOR INGESTION IN THE CENTAUR LIQUID HYDROGEN TANK.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
R. F. Lacovic, and A. J. Stofan. Mar 68, 16p
NASA-TM-X-1482
Contract 891-01-00-06-22

Descriptors: *Centaur launch vehicle, *Liquid hydrogen, *Propellant tanks, *Vapors, Acceleration (physics), Fuel flow, Fuel tank pressurization, Gravimetry, Liquid propellant rocket engines, Pressure distribution, Scale models.

For abstract, see STAR 06 09.
N68-19225 HC$3.00 MF$0.65

ANALYTICAL AND EXPERIMENTAL INVESTIGATIONS CONCERNING THE DUAL MODE HYDRAZINE SYSTEM, TASK 4 SUMMARY REPORT, 1 AUG. 1967 - 1 FEB. 1968.
Hughes Aircraft Co., El Segundo, Calif. Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. Space Systems Div.
W. W. Butcher, W. H. Jones, and R. M. Lodwig.
1 Mar 68, 68p NASA-CR-93663, REPT.-68/22/-2749/B1183-002
Contracts NAS7-100, JPL-951720
Prep- Prepared for Jpl

Descriptors: *Attitude control, *Hydrazines, *Space probes, *Spacecraft maneuvers, Electrolysis, Electrolytes, Spacecraft propulsion, Stoichiometry.

For abstract, see STAR 06 09.
N68-19360 HC$3.00 MF$0.65

DESIGN, DEVELOPMENT AND DEMONSTRATION OF A WARM GAS DISTRIBUTION SYSTEM QUARTERLY REPORT, PERIOD ENDING 31 DEC. 1967.
General Electric Co., Philadelphia, Pa. Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. Missile and Space Div.
15 Jan 68, 23p NASA-CR-93661, REPT.-68SD4203
Contracts NAS7-100, JPL-951988
Prep- Prepared for Jpl

Descriptors: *Gas generators, *Liquid rocket propellants, *Pipelines, *Product development, *Torque motors, Hydrazines, Manufacturing, Satellite attitude control.

For abstract, see STAR 06 09.
N68-19389 HC$3.00 MF$0.65

PRODUCING HOLOGRAMS OF REACTING SPRAYS IN LIQUID PROPELLANT ROCKET ENGINES, PHASE 1 INTERIM REPORT, 1 AUG. 1967 - 7 FEB. 1968.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. TRW Systems, Redondo Beach, Calif.
B. J. Matthews, and R. F. Wuerker. 29 Feb 68, 64p NASA-CR-93662, TRW-68-4712-2-017
Contracts NAS7-100, JPL-952023
Prep- Prepared for Jpl

Descriptors: *Holography, *Liquid rocket propellants, *Propellant combustion, *Pulsed lasers, *Ruby lasers, Cold flow tests, Propellant sprays.

For abstract, see STAR 06 09.
N68-19439 HC$3.00 MF$0.65

NONLINEAR COMBUSTION INSTABILITY IN LIQUID PROPELLANT ROCKET MOTORS.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. Mathematical Applications Group, Inc., White Plains, N. Y.
S. Z. Burstein, and W. Chinitz. 30 Jan 68, 69p NASA-CR-93674, QR-2
Contracts NAS7-100, JPL-951946
Prep- Prepared for Jpl

Descriptors: *Combustion stability, *Diffusion flames, *Fluid dynamics, *Liquid propellant rocket engines, Cylindrical chambers, Dynamic models, Elastic waves, Hydrazines, Nitrogen tetroxide, Nonlinearity, Partial differential equations.

For abstract, see STAR 06 09.
N68-19448 HC$3.00 MF$0.65

DETERMINATION OF THERMODYNAMIC PROPERTIES OF AEROZINE-50, PHASE 1.
Atlantic Research Corp., Alexandria, Va.
J. P. Copeland, J. A. Simmons, and J. M. Spurlock. 21 Apr 67, 45p NASA-CR-65995
Contract NAS9-6720

Descriptors: *Aerozine, *Information retrieval, *Thermodynamics, Distillation, Enthalpy, Entropy, Literature, Pressure distribution, Temperature distribution, Vacuum apparatus.

For abstract, see STAR 06 09.
N68-19466 HC$3.00 MF$0.65

21I. Rocket Propellants

LITERATURE SEARCH ON METHODS OF PARTICLE SIZE MEASUREMENT,
Rohm and Haas Co., Huntsville, Ala. Redstone Research Labs.
Martin L. Essick. 17 Jun 66, 48p S-101
Contract DA-01-021-AMC-13863 (Z)

Descriptors: (*Particle size, Measurement), (*Solid rocket oxidizers, Particle size), Abstracts, Ammonium compounds, Perchlorates, Cadmium compounds, Stearates, Separation, Uranium compounds, Oxides, Fluorides, Magnesium compounds, Sedimentation, Resistance (Electrical), Visual inspection.

A survey of the literature on methods of determination of the particle size of fine powders was performed. A summary of the information obtained is presented and a number of pertinent articles are reviewed in detail. The scope of the survey was limited to measurement in the sub-sieve range and involved primarily those methods of interest in the solid propellant field for measuring ammonium perchlorate. An appendix is included which lists additional references which may be of interest to persons concerned with the size of fine powders. (Author)
AD-483 867 HC$3.00 MF$0.65

POLYMER SYNTHESIS: A SURVEY OF GOVERNMENT CONTRACTS SINCE 1960,
Plastics Technical Evaluation Center Dover N J
For primary bibliographic entry see Field 7C.
AD-666 758 HC$3.00 MF$0.65

THE IONIZATION POTENTIAL AND HEAT OF FORMATION OF THE (CH3)2N RADICAL BY MASS SPECTROMETRY,
Rocket Propulsion Establishment Westcott (England)
For primary bibliographic entry see Field 7D.
AD-667 033 HC$3.00 MF$0.65

A NEW APPLICATION OF PERFECTLY STIRRED REACTOR (P.S.R.) THEORY TO DESIGN OF COMBUSTION CHAMBERS.
Pennsylvania State Univ., University Park. Dept. of Fuel Science.
For primary bibliographic entry see Field 21B.
AD-812 114 HC$3.00 MF$0.65

ANALYTICAL AND EXPERIMENTAL STUDY OF LIQUID-ULLAGE COUPLING AND LOW GRAVITY INTERFACE STABILITY FINAL REPORT, 1 JUN. 1965 - 29 AUG. 1966.
Lockheed Missiles and Space Co., Sunnyvale, Calif.
J. H. Chin, E. Y. Harper, M. P. Hollister, S. E. Hurd, and H. M. Satterlee. 29 Aug 66, 94p
NASA-CR-61620, LMSC-2-05-66-1
Contract NAS8-11525

Descriptors: *Liquid rocket propellants, *Liquid-vapor interfaces, *Mathematical models, *Ullage, Boundary layer transition, Computer programming, Coupling, Heat transfer coefficients, Reduced gravity.

For abstract, see STAR 06 09.
N68-18848 HC$3.00 MF$0.65

GELLING OF CRYOGENIC OXIDIZERS FINAL REPORT, 5 MAY 1965 - 4 SEP. 1966.
Thiokol Chemical Corp., Denville, N. J. Reaction Motors Div.
A. J. Beardell, and R. Gere. 19 Feb 68, 59p
NASA-CR-72152, RMD-5070-F
Contract NAS3-6286

Descriptors: *Gelled rocket propellants, *Lithium fluorides, *Rocket oxidizers, Cryogenic rocket propellants, Freezing, Gels, Pressure distribution, Rods, Thickeners (materials), Viscosity.

For abstract, see STAR 06 09.
N68-19010 HC$3.00 MF$0.65

EXPLORATORY STUDY OF HYPERGOLIC IGNITION SPIKE PHENOMENA, PHASE 2, PART 2, JULY 1 TO SEPTEMBER 30, 1966.
Bureau of Mines, Pittsburgh, Pa. Explosives Research Center.
T. Christos, H. James, Y. Miron, and H. E. Perlee. 30 Sep 66, 30p NASA-CR-93556
NASA ORDER T-39882/G/

Descriptors: *Chemical analysis, *Combustion temperature, *Hydrazine nitrate, *Ignition temperature, Hydrazine engines, Propellant combustion, Residues, Thin films, Water.

For abstract, see STAR 06 09.
N68-19268 HC$3.00 MF$0.65

22. SPACE TECHNOLOGY

22A. Astronautics

TECHNIQUES AND MATERIALS FOR PASSIVE THERMAL CONTROL OF RIGID AND FLEXIBLE EXTRAVEHICULAR SPACE ENCLOSURES.
Little (Arthur D) Inc Cambridge Mass
For primary bibliographic entry see Field 6P.
AD-666 940 HC$3.00 MF$0.65

NUMBER DENSITY OF MARTIAN CRATERS.
Bellcomm, Inc., Washington, D. C.
A. H. Marcus. 29 Jan 68, 20p NASA-CR-93407, TR-68-710-1
Contract NASW-417

Descriptors: *Lunar craters, *Mars surface, *Meteorite craters, *Statistical distributions,

Lunar topography, Mariner space probes, Numerical analysis, Photogrammetry, Photointerpretation, Spaceborne photography, Terrain analysis.

For abstract, see STAR 06 09.
N68-18381 HC$3.00 MF$0.65

SUPPORT MANUAL FOR APOLLO LUNAR SURFACE DRILL (ALSD).
Martin Co., Baltimore, Md.
For primary bibliographic entry see Field 13I.
For abstract, see STAR 06 09.
N68-18599 HC$3.00 MF$0.65

PRE-ORBITER INVESTIGATION FINAL REPORT.
Army Map Service, Washington, D. C.
R. W. Harpe, G. J. Schiebel, and M. J. Short. Jul 67, 529p NASA-CR-93433, TR-61
NASA ORDER T-55870

Descriptors: *Lunar orbiter, *Lunar photographs, *Lunar topography, *Mapping, *Photographic equipment, Lunar probes, Lunar satellites, Photogrammetry.

For abstract, see STAR 06 09.
N68-18768 HC$3.00 MF$0.65

DYNAMIC STABILITY OF SPACE VEHICLES. VOLUME 10 - EXIT STABILITY.
General Dynamics Corp., San Diego, Calif.
R. F. Ringland. Mar 68, 166p NASA-CR-944, GD/C-BTD-67-029
Contract NAS8-11486
Coll- 166 P Refs

Descriptors: *Aerodynamic stability, *Earth atmosphere, *Launch vehicles, *Stability tests, Automatic pilots, Computerized simulation, Dynamic response, Equations of motion, Flight control, Frequency response, Linear systems, Liquid sloshing, Mathematical models, Propellant tanks, Reentry vehicles, Reliability engineering, Rigid structures, Roots of equations, Statistical analysis, Structural stability, Systems engineering, Thrust vector control, Time functions, Trajectory analysis.

For abstract, see STAR 06 09.
N68-18825 HC$3.00 MF$0.65

TECHNOLOGICAL REQUIREMENTS COMMON TO MANNED PLANETARY MISSIONS. APPENDIX A - MISSION REQUIREMENTS.
North American Rockwell Corp., Downey, Calif. Space Div.
R. D. Meston. Jan 68, 349p NASA-CR-73189, SD-67-621-2
Contract NAS2-3918

Descriptors: *Interplanetary flight, *Manned space flight, *Mission planning, *Trajectory analysis, Interplanetary trajectories, Jupiter (planet), Launch dates, Mars (planet), Mercury (planet), Venus (planet).

For abstract, see STAR 06 09.
N68-18827 HC$3.00 MF$0.65

TECHNOLOGICAL REQUIREMENTS COMMON TO MANNED PLANETRAY MISSIONS.
North American Rockwell Corp., Downey, Calif. Space Div.
R. D. Meston. Jan 68, 122p NASA-CR-73188, SD-67-621-1
Contract NAS2-3918

Descriptors: *Interplanetary spacecraft, *Manned space flight, *Spacecraft performance, *Systems engineering, Interplanetary trajectories, Planetary environments, Space missions, Spacecraft modules, Technologies.

For abstract, see STAR 06 09.
N68-18851 HC$3.00 MF$0.65

TECHNOLOGICAL REQUIREMENTS COMMON TO MANNED PLANETARY MISSIONS FINAL REPORT.
North American Rockwell Corp., Downey, Calif. Space Div.
R. D. Meston. Jan 68, 26p NASA-CR-73187, SD-67-1086
Contract NAS2-3918

Descriptors: *Mission planning, *Planetary environments, *Spacecraft guidance, *Systems analysis, Life support systems, Space missions, Spacecraft modules, Technologies, Trajectory analysis.

For abstract, see STAR 06 09.
N68-18943 HC$3.00 MF$0.65

LUNAR DUST DEGRADATION EFFECTS AND REMOVAL/PREVENTION CONCEPTS. VOLUME I - SUMMARY FINAL REPORT.
Northrop Space Labs., Huntsville, Ala.
J. G. Adams, B. L. Cline, N. A. Contaxes, R. D. Johnson, and H. Seaman. 7 Jun 67, 19p NASA-CR-93594, TR-792-7-207A, V. 1
Contract NAS8-20116

Descriptors: *Heat radiators, *Lunar dust, *Radiative heat transfer, Degradation, Emissivity, Infrared spectra, Solar radiation, Temperature control, Thermal insulation.

For abstract, see STAR 06 09.
N68-19020 HC$3.00 MF$0.65

VOYAGER SPACECRAFT PHASE B, TASK D. VOLUME 4 - ENGINEERING TASKS. BOOK 4 - MARS ATMOSPHERE DEFINITION FINAL REPORT.
General Electric Co., Philadelphia, Pa. Missile and Space Div.
16 Oct 67, 114p NASA-CR-93537, DIN-67SD4379, V. 4, BK. 4
Contract NAS8-22603

Descriptors: *Atmospheric composition, *Mars atmosphere, *Reaction kinetics, *Voyager project, Altitude, Atmospheric models, Physical properties, Space-time functions.

For abstract, see STAR 06 09.
N68-19093 HC$3.00 MF$0.65

THE EXPLORATION OF PHOBOS AND THE CONSTANT OF GRAVITATION.
National Aeronautics and Space Administration. Goddard Inst. for Space Studies, New York.
A. Finzi. Feb 68, 10p NASA-TM-X-60921

Descriptors: *Mars surface, *Phobos, *Planetary landing, *Radio signals, Astrophysics, Celestial bodies, Natural satellites, Occultation, Radio transmission, Topography.

For abstract, see STAR 06 09.
N68-19139 HC$3.00 MF$0.65

INTEGRATED MANNED INTERPLANETARY SPACECRAFT CONCEPT DEFINITION. VOLUME 2 - SYSTEM ASSESSMENT AND SENSITIVITIES FINAL REPORT.
Boeing Co., Seattle, Wash. Aerospace Group.
Jan 68, 192p NASA-CR-66559, D2-113544-2, V. 2
Contract NAS1-6774

Descriptors: *Handbooks, *Interplanetary flight, *Management planning, *Manned space flight, *Mars probes, *Venus probes, Interstellar travel, Space missions.

For abstract, see STAR 06 09.
N68-19142 HC$3.00 MF$0.65

CALCULATIONS OF SOLAR PLASMA INTERACTION WITH MAGNETIC FIELD OF CURRENT LOOP AND TWO PARALLEL INFINITE LINES OF CURRENT.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
A. L. Julius, Jr., and D. J. Mc Kinzie, Jr.. Mar 68, 28p NASA-TN-D-4304
Contract 129-01-05-05-22

Descriptors: *Magnetic fields, *Magnetosphere, *Solar wind, Charged particles, Geomagnetism, Lift drag ratio, Plasma physics, Solar flares, Spacecraft configurations, Superconductivity.

For abstract, see STAR 06 09.
N68-19188 HC$3.00 MF$0.65

TEN YEARS OF SPACE RESEARCH IN THE USSR.
Desyat' Let Issledovaniya Kosmosa V Sssr
National Aeronautics and Space Administration, Washington, D. C.
B. V. Raushenbakh, G. A. Skuridin, M. K. Tikhonravov, and O. L. Vaysberg. Feb 68, 43p NASA-TT-F-11500
Tran- Transl. Into English From Kosmich. Issled. (Moscow), V. 5, No. 5, 1967 P 643-679

Descriptors: *Artificial satellites, *Manned spacecraft, *Space flight, *U.S.S.R. space program, Aerospace sciences, Histories, Scientific satellites, Spacecraft launching.

For abstract, see STAR 06 09.
N68-19198 HC$3.00 MF$0.65

TECHNOLOGICAL REQUIREMENTS COMMON TO MANNED PLANETARY MISSIONS. APPENDIX D - SYSTEM SYNTHESIS AND PARAMETRIC ANALYSIS FINAL REPORT.
North American Rockwell Corp., Downey, Calif. Space Div.
R. D. Meston. Jan 68, 226p NASA-CR-73192, SD-67-621-5, APP. D
Contract NAS2-3918

Descriptors: *Human factors engineering, *Interplanetary flight, *Manned space flight, *Systems engineering, Interplanetary spacecraft, Mission planning, Modules, Propulsion system configurations, Reentry vehicles, Space exploration, Systems analysis.

For abstract, see STAR 06 09.
N68-19223 HC$3.00 MF$0.65

STUDY FOR THE COLLECTION OF HUMAN ENGINEERING DATA FOR MAINTENANCE AND REPAIR OF ADVANCED SPACE SYSTEMS. VOLUME 1 - SUMMARY TECHNICAL REPORT FINAL STUDY REPORT, 26 AUG. 1966 - 31 DEC. 1967.
General Electric Co., Philadelphia, Pa. Missile and Space Div.
For primary bibliographic entry see Field 5E.
For abstract, see STAR 06 09.
N68-19296 HC$3.00 MF$0.65

A FORTRAN PROGRAM FOR COMPUTATION OF MASS IN EARTH ORBIT REQUIRED FOR INTERPLANETARY MISSIONS.
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
A. C. Mascy, and S. W. Pitts. Apr 68, 29p NASA-TM-X-1541
Contract 789-40-01-08-00-15

Descriptors: *Computer programs, *Flyby missions, *Interplanetary trajectories, *Mass, Earth orbits, Fortran, Interplanetary spacecraft, Mission planning, Orbit calculation, Propulsion system performance.

For abstract, see STAR 06 09.
N68-19330 HC$3.00 MF$0.65

SPACE AND RE-ENTRY SYSTEMS - DEVELOPMENT OF ADVANCED SOIL SAMPLER TECHNOLOGY, VOLUME 2 FINAL REPORT, 28 JUN. 1967 - 31 JAN. 1968.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. Philco-ford Corp., Newport Beach, Calif. Space and Re-entry Systems Div.
W. H. Bachle, and G. P. Zebal. 31 Jan 68, 206p NASA-CR-93679, UG-4289, V. 2
Contracts NAS7-100, JPL-951935
Prep- Prepared for Jpl

Descriptors: *Samplers, *Soils, Assaying, Biochemistry, Chemical composition, Minerals, Models, Particle motion, Particle size distribution, Sampling, Viability.

For abstract, see STAR 06 09.
N68-19391 HC$3.00 MF$0.65

SPACE AND RE-ENTRY SYSTEMS - DEVELOPMENT OF ADVANCED SOIL SAMPLER TECHNOLOGY, VOLUME 1 FINAL REPORT, 28 JUN. 1967 - 31 JAN. 1968.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. Philco-ford Corp., Newport Beach, Calif. Space and Re-entry Systems Div.
W. H. Bachle, and G. P. Zebal. 31 Jan 68, 269p NASA-CR-93678, UG-4289, V. 1
Contracts NAS7-100, JPL-951935
Prep- Prepared for Jpl

Descriptors: *Performance tests, *Planetary surfaces, *Product development, *Samplers, *Sieves, *Soil science, Brushes, Space probes, Surface properties.

For abstract, see STAR 06 09.
N68-19394 HC$3.00 MF$0.65

WEIGHTLESSNESS RESEARCH AT O.N.E.R.A..
National Aeronautics and Space Administration, Washington, D. C.
For primary bibliographic entry see Field 14B.
For abstract, see STAR 06 09.
N68-19399 HC$3.00 MF$0.65

TECHNOLOGICAL REQUIREMENTS COMMON TO MANNED PLANETARY MISSIONS. APPENDIX B - ENVIRONMENTS FINAL REPORT.
North American Rockwell Corp., Downey, Calif. Space Div.
R. D. Meston. Jan 68, 107p NASA-CR-73190, SD-67-621-3, APP. B
Contract NAS2-3918

Descriptors: *Heat shielding, *Interplanetary flight, *Manned space flight, *Meteoroid protection, *Radiation shielding, Human factors engineering, Interplanetary spacecraft, Meteoroid hazards, Mission planning, Radiation effects, Spacecraft structures, Thermal radiation.

For abstract, see STAR 06 09.
N68-19429 HC$3.00 MF$0.65

A MARTIAN QUARANTINE RISK MODEL.
Florida State Univ., Tallahassee. Dept. of Statistics.
R. G. Cornell, and S. E. Steg. 8 Apr 68, 30p NASA-CR-93695, TR-15
Contract NGR-10-004-029

Descriptors: *Landing modules, *Mars (planet), *Mathematical models, *Spacecraft sterilization, Biological effects, Losses, Microorganisms, Planetary landing, Risk, Spacecraft contamination.

For abstract, see STAR 06 09.
N68-19430 HC$3.00 MF$0.65

LUNAR NAVIGATION STUDY, VOLUME 2 FINAL REPORT, JAN. - DEC. 1966.
Bendix Corp., Ann Arbor, Mich.
J. T. Broadbent, R. B. Odden, T. T. Trexler, and J. J. Vary. Dec 66, 555p NASA-CR-93473, BSR-1472, V. 2
Contract NAS8-20322

Descriptors: *Error analysis, *Lunar roving vehicles, *Navigation, Data processing, Dead reckoning, Lunar topography, Mathematical models, Mission planning, Position (location).

For abstract, see STAR 06 09.
N68-19456 HC$3.00 MF$0.65

SPECTROSCOPIC STUDY OF THE GAS CAP RADIATION INTENSITY FOR SIMULATED MARTIAN ATMOSPHERIC PROBES.
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
P. A. Croce, and W. Winovich. 1966, 47p NASA-TM-X-57250
Conf- Presented At the Symp. on Interdisciplinary Aspects of Radiative Energy Transfer, Philadelphia, Pa., 22-26 Feb. 1966

Descriptors: *Ablative nose cones, *Atmospheric entry simulation, *Gas spectroscopy, *Mars atmosphere, *Radiant flux density, Argon, Blunt bodies, Carbon dioxide, Gas mixtures, Heat shielding, Mars probes, Nitrogen, Plasma jet wind tunnels, Spectroscopic analysis.

For abstract, see STAR 06 09.
N68-19470 HC$3.00 MF$0.65

STUDY FOR THE COLLECTION OF HUMAN ENGINEERING DATA FOR MAINTENANCE AND REPAIR OF ADVANCED SPACE SYSTEMS. VOLUME 2 - DETAILED TECHNICAL REPORT FINAL STUDY REPORT.
General Electric Co., Philadelphia, Pa. Missile and Space Div.
For primary bibliographic entry see Field 5E.
For abstract, see STAR 06 09.
N68-19493 HC$3.00 MF$0.65

22B. Spacecraft

EFFECTS OF RADIATED AERODYNAMIC NOISE ON MODEL BOUNDARY-LAYER TRANSITION IN SUPERSONIC AND HYPERSONIC WIND TUNNELS.
Final rept. 3 Jun 66-23 Jan 67,
Arnold Engineering Development Center Arnold Air Force Station Tenn
S. R. Pate, and C. J. Schueler. Mar 68, 94p Rept no. AEDC-TR-67-236
Contract AF 40 (600)-1200
Prepared in cooperation with ARO, Inc., Tullahoma, Tenn.

Descriptors: (*Reentry vehicles, Boundary layer transition), (*Boundary layer transition, *Aerodynamic noise), Aerodynamic configurations, Wind tunnel models, Supersonic characteristics, Hypersonic characteristics, Model tests, Cylindrical bodies, Reynolds number, Flat plate models, Leading edge, Slender bodies.

Boundary-layer transition and aerodynamic noise measurements were made on sharp leading-edge two-dimensional models in supersonic wind tunnels (1 ft to 16 ft). These data showed, conclusively, a significant and continuous increase in transition Reynolds number and a significant decrease in radiated aerodynamic noise (generated by the tunnel wall turbulent boundary layer) with increasing tunnel size. Results obtained in the AEDC-VKF Tunnel A from a shroud configuration placed concentrically around a hollow cylinder transition model and a flat plate microphone model further demonstrated the strong adverse effects that radiated aerodynamic noise will have on transition. A correlation of transition Reynolds numbers based on transition data from nine wind tunnels ($3 < \text{or} = M < \text{or} = 8$) was developed. The correlation was dependent only on the tunnel wall, turbulent boundary layer, aerodynamic noise parameters (displacement thickness and skin friction), and the tunnel test section circumference. (Author)
AD-666 644 HC$3.00 MF$0.65

FOUR METHODS OF SOLVING FOR THE SPHERICAL ERROR PROBABLE ASSOCIATED WITH A THREE-DIMENSIONAL NORMAL DISTRIBUTION.
Air Force Missile Development Center Holloman AFB N Mex
For primary bibliographic entry see Field 17I.
AD-666 646 HC$3.00 MF$0.65

ROCKET AND SATELLITE TECHNIQUES FOR MEASUREMENT OF ELECTRON DENSITY AND RELATED IONOSPHERIC PARAMETERS.
Utah Univ Salt Lake City Upper Air Research Labs
For primary bibliographic entry see Field 4A.
AD-666 671 HC$3.00 MF$0.65

PROGRAM SOLUTIONS TO SPACE SCIENCE PROBLEMS.
Final rept. Aug 66-Feb 68,
International Business Machines Corp Cambridge Mass Cambridge Advanced Space Systems Dept
Louise Coury. Feb 68, 61p
AFCRL-68-0046
Contract AF 19 (628)-6065

Descriptors: (*Scientific satellites, Computer programs), Analysis, Subroutines, Radar tracking, Orbital trajectories, Terrestrial magnetism, Polynomials, Telemetering data, Instruction manuals, Magnetic fields, Programming (Computers).
Identifiers: *Orbiting geophysical observatories, OGO.

Describes the analysis and programming required in the development of three computer programs which cover a wide variety of scientific research. Some of these investigations are inter-related, such as the geomagnetic co-ordinate conversion and magnetic field determinations, while others range from radar-trajectory analysis to electromagnetic theory. For each case, this report describes the mathematical development as well as the programming aspects in order to more completely define the problems and increase their applicability. While the problem descriptions of this document are mathematically oriented, the sections explaining the programming aspects of each problem are designed to facilitate the use of the computer programs by programmer and scientist alike. The specific topics covered in this report are: Orbiting Geophysical Observatory; Trajectory analysis for single station radar; Magnetic field and B and L determination. (Author)
AD-666 687 HC$3.00 MF$0.65

SIX-CHANNEL READOUT FOR A CHROMATOGRAPHIC ANALYSIS OF SPACE-CABIN ATMOSPHERE.
Melpar Inc Falls Church Va
For primary bibliographic entry see Field 6K.
AD-666 692 HC$3.00 MF$0.65

OPERATION AND MAINTENANCE MANUAL SIX-CHANNEL READOUT FOR A CHROMATOGRAPHIC ANALYSIS FOR SPACE CABIN ATMOSPHERES.
Melpar Inc Falls Church Va
For primary bibliographic entry see Field 6K.
AD-666 693 HC$3.00 MF$0.65

DETERMINATION OF THE GRAVITATIONAL FIELD OF THE MOON BY THE MOVEMENT OF THE ARTIFICIAL MOON SATELLITE LUNA-10,
Foreign Technology Div Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 3A.
AD-666 737 HC$3.00 MF$0.65

A PROPOSED ANALOG TO DIGITAL CONVERTER FOR SMALL EARTH SATELLITES.
Technical memo.,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
J. C. Loessi. Oct 67, 64p Rept no. APL-TG-954
Contract NOw-62-0604

Descriptors: (*Satellites (Artificial), Telemeter systems), (*Telemeter systems, *Analog-to-digital converters), Errors, Integrated circuits, Theory, Power, Scientific satellites, Navigation satellites, Pulse duration modulation, Navigation satellites, Feedback amplifiers, Integrators, Drift, Capacitors, Reliability (Electronics), Naval operations.
Identifiers: Explorer.

This proposal describes an analog to digital converter suitable for use in small earth orbiting satellites. The theory of operation is also discussed. Some of the advantages of this converter are that (a) for the most part it can be constructed from available integrated circuits, (b) it is small in size and consumes less power than A/D converters of other types, and (c) the design requires no parts with light tolerances and is free from errors due to drift. It is proposed that this analog to digital converter be used in the X-Ray Explorer Satellite and in the Navy Navigation Satellite programs. (Author)
AD-666 811 HC$3.00 MF$0.65

FOREIGN SCIENCE BULLETIN, VOL. 4, NO. 3, 1968.
Library of Congress Washington D C Aerospace Technology Div
For primary bibliographic entry see Field 20G.
AD-666 875 HC$3.00 MF$0.65

EFFECTS OF NONEQUILIBRIUM AND MASS TRANSFER ON A BLUNT OGIVE PRESSURE DISTRIBUTION.
Final rept. 1 Nov-31 Dec 67,
Arnold Engineering Development Center Arnold Air Force Station Tenn
Clark H. Lewis, John C. Adams, Jr., H. S. Brahinsky, G. E. Gilley, and D. H. Wurst. Mar 68, 19p
Rept no. AEDC-TR-68-31
Contract AF 40 (600)-1200
Prepared in cooperation with ARO, Inc., Tullahoma, Tenn.

Descriptors: (*Lifting reentry vehicles, Flow fields), Atmosphere entry, Nonequilibrium flow, Mass transfer, Blunt bodies, Ogives, Pressure, Distribution, Stagnation point, Surface properties, Angle of attack, Ablation, Frozen equilibrium flow, Difference equations, High altitude, Boundary layer.
Identifiers: Inviscid flow, *Lifting body reentry vehicles.

Pressure distributions over a spherically blunted ogive were computed for perfect (gamma = 1.4) gas, equilibrium air, and nonequilibrium inviscid outer flow fields with nonreacting and reacting boundary-layer flow fields. The effects of surface mass transfer and displacement were also included in the nonreacting flow field studies. The results show that for a short (15 nose radii), blunt body at the altitude and velocity conditions considered, the effects of (inviscid and viscous) chemistry on the surface pressure distributions were from about 10 to 20 percent, and the effects of displacement and mass transfer were less than 10 percent in general. (Author)
AD-666 910 HC$3.00 MF$0.65

POSTFLIGHT (AS-202) APOLLO COMMAND MODULE AERODYNAMIC SIMULATION TESTS.
Final rept. Dec 66-May 67,
Arnold Engineering Development Center Arnold Air Force Station Tenn
B. J. Griffith, and D. E. Boylan. Mar 68, 113p
Rept no. AEDC-TR-67-238
Contract AF 40 (600)-1200
Prepared in cooperation with ARO, Inc., Tullahoma, Tenn.

Descriptors: (*Manned spacecraft, Aerodynamic characteristics), Simulation, Lunar craft, Wind tunnel models, Pitch (Motion), Angle of attack, Mach number, Reynolds number, Tables, Blunt bodies, Model tests, Statistical analysis.
Identifiers: Apollo, Postflight testing, Apollo command modules, Sting effects.

A comprehensive postflight wind tunnel investigation of the Apollo Command Module was conducted to resolve several anomalies between flight (AS-202) and preflight aerodynamic data. Attention was focused on (1) simulating the actual vehicle 'as flown', (2) obtaining consistent pitch plane force measurements in the angle-of-attack range 150 < or = alpha < or = 180 deg, (3) the effect of Mach number over a range of 3 to 20, (4) the effect of Reynolds number, and (5) possible sting effects. Results indicated that prior failure to duplicate the asymmetrical wavy heat shield in preflight testing resulted in a significant error in trim angle-of-attack prediction. In addition, a strong viscous influence was found to extend down to an altitude of about 220,000 ft. Also, a Mach number influence to a value of about 14 was found which is substantially higher than previous blunt body investigations have indicated. (Author)
AD-666 927 HC$3.00 MF$0.65

RADIATION COUPLED SHOCK LAYER INCLUDING UPSTREAM ABSORPTION EFFECTS.
Interim rept.,
Massachusetts Inst of Tech Cambridge Aerophysics Lab
Kuei-Yuan Chien. 29 Feb 68, 16p
AFOSR-68-0549
Contract AF 49 (638)-1621
Availability: Published in International Journal of Heat Mass Transfer, v10 p1601-13 1967.

Descriptors: (*Reentry vehicles, Thermal radiation), (*Atmosphere entry, Heat transfer), Hypersonic characteristics, Absorption, Shock waves, Aerodynamic heating, Heat flux, Porous materials, One-dimensional flow.
Identifiers: Energy transfer.

The method of Heaslet and Baldwin is extended with the introduction of a cold, black and porous wall, so as to effectively alter the downstream boundary condition for absorbing shock layers. It is shown that the general problem may be resolved into five subcases related to the net variation of radiative flux transfer across the shock with change in shock stand-off distance. The gas ahead of the shock may be either heated or cooled. For certain cases of interest this precursory heating may be significant. (Author)
AD-667 009 Not available from CFSTI.

A CHARACTERISTICS APPROACH TO RADIATION GASDYNAMICS,
Massachusetts Inst of Tech Cambridge Dept of Aeronautics and Astronautics
David Finkleman. 29 Feb 68, 17p
AFOSR-68-0616
Contract AF 49 (638)-1621
Availability: Published in Proceedings of AIAA Aerospace Sciences Meeting (6th), 22-4 Jan 68, New York, paper no. 68-163.

Descriptors: (*Reentry vehicles, Hypersonic characteristics), Thermal radiation, Slender bodies, One-dimensional flow, Absorption, Shock waves, Entropy, Flow fields, Emissivity, Design, Pistons.
Identifiers: Method of characteristics, Gas dynamics, Blowing, Suction.

Since the equations which govern unsteady radiation gas-dynamics are hyperbolic, general situations are attacked with a numerical method of characteristics. Upstream absorption of shock layer radiation is included, and it is proved that only Mark radiation boundary conditions are appropriate to a P sub 1 differential approximation of one-dimensional radiative fields. Flow fields generated by pistons inserted into ideal gases with arbitrary absorption properties are investigated with the differential approximation and the full transfer equation. Results show that the differential approximation predicts surface pressures and heat transfer rates accurately and that linear theories may be in error. Nonmonotonic surface pressure histories are noted, and it is observed that surface emissivities and temperatures exert 'blowing' or 'suction' upon entropy layers. Upstream absorption is a dominant mechanism in flow field evolution, and the effects of radiation upon pressure and velocity may be comparable to those upon temperature. (Author)
AD-667 097 Not available from CFSTI.

APPROXIMATE ANALYSIS OF LINEARIZED INVISCID RELAXING GAS FLOW,
Massachusetts Inst of Tech Cambridge Aerophysics Lab
Mark B. Sussman, and Judson R. Baron. 24 Feb 68, 12p
AFOSR-68-0548
Contract AF 49 (638)-1621
Availability: Published in Physics of Fluids, v10 n10 p2128-37 1967.

Descriptors: (*Reentry vehicles, Flow fields), Approximation (Mathematics), Linear systems, Partial differential equations, Nonequilibrium flow, Airfoils, Projectiles, Acoustic properties, Asymptotic series, Relaxation time.
Identifiers: Inviscid flow.

Approximate analytical solutions to the third-order, linear partial differential equations governing small disturbances from a uniform state in a relaxing gas are obtained. Such solutions are of interest for providing a qualitative understanding of nonequilibrium flow over thin airfoils and projectiles. Most previous investigations have, due to the complexity of the solution for even this linear problem, presented restricted results valid primarily at the flow boundaries. In contrast, the emphasis is now to provide simplified approximate expressions useful to examine properties at any point in the flow. The particular problem examined is the motion of an infinite mass of gas due to a given planar, cylindrical, or spherical piston motion. The approximation scheme used to simplify the governing equation involves the assumption that the frozen and equilibrium sound speeds are nearly equal, a condition frequently met in practice. The perturbation scheme is found to be singular due to the assumed infinite domain of the gas. The formalism of the method of matched asymptotic expansions is utilized to obtain uniformly valid solutions. Comparison of some of the approximate results is made with exact solutions determined numerically. (Author)
AD-667 098 Not available from CFSTI.

TIME-VARYING REFLECTION FROM ROTATING CONVEX SURFACES,
Mitre Corp Bedford Mass
For primary bibliographic entry see Field 20F.
AD-667 123 Not available from CFSTI.

EXPERIMENTAL INVESTIGATION OF SUPERSONIC LAMINAR, TWO-DIMENSIONAL BOUNDARY-LAYER SEPARATION IN A COMPRESSION CORNER WITH AND WITHOUT COOLING.
Revised ed.,
California Inst of Tech Pasadena Graduate Aeronautical Labs
John E. Lewis, Toshi Kubota, and Lester Lees.
17 Jul 67, 8p Rept no. GALCIT-Pub-643
Contract DA-31-124-ARO (D)-33
Revision of report dated 3 Apr 67. Presented at the AIAA Aerospace Sciences Meeting (5th), New York, 23-26 Jan 67, Paper 67-191.
Availability: Published in AIAA Journal, v6 n3 p7-14 Jan 1968.

Descriptors: (*Hypersonic test vehicles, *Flow separation), Hypersonic characteristics, Laminar flow, Two-dimensional flow, Boundary layer, Curved profiles, Cooling, Aspect ratio, Reynolds number, Interactions, Adiabatic gas flow, Boundary layer transition, Supersonic characteristics, Compressible flow, Wind tunnel models.
Identifiers: Pressure distribution, Defender project, Corner flow.

An experimental investigation of the boundary-layer separation associated with a compression corner was conducted in a Mach 6 wind tunnel, and a supplementary study was performed in a supersonic wind tunnel. Special emphasis was placed on the development of a wind-tunnel model that approximated true two-dimensional flow, and could be run in either a highly cooled or an adiabatic configuration. The basic measurements consist of the model surface pressure and temperature, and Pitot surveys of the boundary layer. The surface pressure distributions for the adiabatic wall configurations are compared with the theory of

Lees and Reeves (modified by Klineberg and Lees). The surface pressure distribution for the cold wall was compared with the adiabatic configuration for a laminar interaction, and the dependence on Reynolds number for both laminar and transitional interactions was observed. The free interaction similarity suggested by Chapman was empirically tested and found to be a good approximation fo the adiabatic configuration, but it failed to correlate the cooled case with the adiabatic case. The scaling suggested by Curle was tested and found to eliminate this deficiency. (Author)
AD-667 163 Not available from CFSTI.

FAR WAKE BEHIND CYLINDERS AT HYPERSONIC SPEEDS: II. STABILITY.
Revised ed.,
California Inst of Tech Pasadena Graduate Aeronautical Labs
Wilhelm Behrens. 9 Aug 67, 8p Rept no. GALCIT-Pub-644
Contract DA-31-124-ARO (D)-33
Presented as Part II of Paper 67-32 at the AIAA Aerospace Sciences Meeting (5th), 23-6 Jan 67, N.Y. Revision of report dated 17 Apr 67. See also Part I, AD-665 327.
Availability: Published in AIAA Journal, v6 n2 p225-32 Feb 1968.

Descriptors: (*Hypersonic test vehicles, Wake), Cylindrical bodies, Stability, Hypersonic characteristics, Reynolds number, Flow fields, Laminar flow, Flat plate models.

At Reynolds numbers below 10,000 the inner viscous wake behind cylinders at Mach 6 is entirely laminar. At these low Reynolds numbers the outer wake caused by the bow shock becomes transitional thousands of diameters downstream. Flowfield measurements (Part I) indicated strong deviations from the behavior of laminar steady flow from a certain point on, suggesting a division into linear and nonlinear wake instability regions. Fluctuation measurements confirm this supposition at four Reynolds numbers. Wake instabilities were investigated experimentally up to a distance of 12,000 diameters behind the cylinder in a Reynolds number range of 200 to 4,000. Additional measurements were performed in the regime where both inner and outer wake instabilities occur. In the linear region close correspondence with linear inviscid stability theory was found. The nonlinear instability region is a long stretched-out region in comparison with the wake at low speeds behind a flat plate. A further increase of the fundamental instability component and a sudden growth of the first harmonic is observed. A tentative picture is given of the onset of nonlinearity and/or transition in the inner and outer wakes behind blunt bodies at hypersonic speeds. (Author)
AD-667 164 Not available from CFSTI.

STUDY AND APPLICATIONS OF RETRODIRECTIVE AND SELF ADAPTIVE ELECTROMAGNETIC-WAVE PHASE CONTROLS TO A MARS PROBE.
Stanford Research Inst., Menlo Park, Calif.
For primary bibliographic entry see Field 17B.
For abstract, see STAR 06 09.
N68-18484 HC$3.00 MF$0.65

EVALUATION OF THE THERMAL PROPERTIES OF MATERIALS. VOLUME 1 - TECHNICAL REPORT FINAL REPORT, 29 JUN. 1965 - 28 JUN. 1966.
Avco Corp., Lowell, Mass. Space Systems Div.
For primary bibliographic entry see Field 20M.

For abstract, see STAR 06 09.
N68-18488 HC$3.00 MF$0.65

ADVANCED VOLTAGE REGULATOR TECHNIQUES AS APPLIED TO MAXIMUM POWER POINT TRACKING SYSTEMS FOR THE NIMBUS METEOROLOGICAL SATELLITE FINAL REPORT, 16 JUN. 1965 - 10 OCT. 1967.
Radio Corp. of America, Princeton, N. J. Astro-electronics Div.
For primary bibliographic entry see Field 10B.
For abstract, see STAR 06 09.
N68-18503 HC$3.00 MF$0.65

SURVEYOR SPACECRAFT SYSTEM - SURVEYOR 1 FLIGHT PERFORMANCE, VOLUME 1 FINAL REPORT.
Hughes Aircraft Co., El Segundo, Calif. Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. Space Systems Div.
K. C. Beall, J. D. Cloud, and R. H. Leuschner.
Oct 66, 430p NASA-CR-93493, SSD-68189R, V. 1
Contracts NAS7-100, JPL-950056
Prep- Prepared for Jpl

Descriptors: *Flight characteristics, *Performance prediction, *Space missions, *Spacecraft design, *Surveyor 1 lunar probe, Data processing, Environmental control, Systems analysis, Temperature control.

For abstract, see STAR 06 09.
N68-18654 HC$3.00 MF$0.65

SURVEYOR SPACECRAFT SYSTEM - SURVEYOR 1 FLIGHT PERFORMANCE, VOLUME 2 FINAL REPORT.
Hughes Aircraft Co., El Segundo, Calif. Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. Space Systems Div.
K. C. Beall, J. D. Cloud, and R. H. Leuschner.
Oct 66, 390p NASA-CR-93491, SSD-68222R, V. 2
Contracts NAS7-100, JPL-950056
Prep- Prepared for Jpl

Descriptors: *Data links, *Flight characteristics, *Signal processing, *Spacecraft control, *Spacecraft power supplies, *Surveyor 1 lunar probe, *Systems analysis, Data processing equipment, Flight control, Radio frequencies, Soft landing.

For abstract, see STAR 06 09.
N68-18655 HC$3.00 MF$0.65

SURVEYOR SPACECRAFT SYSTEM - SURVEYOR 1 FLIGHT PERFORMANCE, VOLUME 3 FINAL REPORT.
Hughes Aircraft Co., El Segundo, Calif. Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. Space Systems Div.
K. C. Beall, J. D. Cloud, and R. H. Leuschner.
Oct 66, 317p NASA-CR-93494, SSD-68223R, V. 3
Contracts NAS7-100, JPL-950056
Prep- Prepared for Jpl

Descriptors: *Propulsion system performance, *Radar equipment, *Radio altimeters, *Retrorocket engines, *Spacecraft television, *Surveyor 1 lunar probe, *Systems analysis, Flight characteristics, Omnidirectional antennas, System failures, Trajectory analysis.

For abstract, see STAR 06 09.
N68-18656 HC$3.00 MF$0.65

SURVEYOR SPACECRAFT SYSTEM - SURVEYOR 2 FLIGHT PERFORMANCE FINAL REPORT.
Hughes Aircraft Co., El Segundo, Calif. Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. Space Systems Div.
J. D. Cloud, R. H. Leuschner, and T. B. Van Horne. Jan 67, 565p NASA-CR-93490, SSD-68189-2R
Contracts NAS7-100, JPL-950056
Prep- Prepared for Jpl

Descriptors: *Flight characteristics, *Spacecraft performance, *Surveyor lunar probes, Failure, Midcourse guidance, Preflight analysis, Space missions, Spacecraft design, Systems analysis, Tumbling motion.

For abstract, see STAR 06 09.
N68-18657 HC$3.00 MF$0.65

SURVEYOR SPACECRAFT SYSTEM - SURVEYOR 3 FLIGHT PERFORMANCE FINAL REPORT.
Hughes Aircraft Co., El Segundo, Calif. Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. Space Systems Div.
J. D. Cloud, R. H. Leuschner, and T. B. Van Horne. Jul 67, 563p NASA-CR-93492, SSD-68189-3
Contracts NAS7-100, JPL-950056
Prep- Prepared for Jpl

Descriptors: *Flight characteristics, *Lunar soil, *Spacecraft performance, *Surveyor lunar probes, *Television equipment, Lunar topography, Postflight analysis, Radio altimeters, Real time operation, Spacecraft design, Systems analysis, Telemetry.

For abstract, see STAR 06 09.
N68-18658 HC$3.00 MF$0.65

SURVEYOR SPACECRAFT SYSTEM - SURVEYOR 4 FLIGHT PERFORMANCE FINAL REPORT.
Hughes Aircraft Co., El Segundo, Calif. Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. Space Systems Div.
J. D. Cloud, R. H. Leuschner, and T. B. Van Horne. Sep 67, 394p NASA-CR-93487, SSD-68189-4
Contracts NAS7-100, JPL-950056
Prep- Prepared for Jpl

Descriptors: *Flight characteristics, *Spacecraft performance, *Surveyor lunar probes, Failure, Postflight analysis, Real time operation, Retrofiring, Spacecraft design, Systems analysis, Telemetry.

For abstract, see STAR 06 09.
N68-18659 HC$3.00 MF$0.65

SURVEYOR SPACECRAFT SYSTEM - SURVEYOR 5 FLIGHT PERFORMANCE FINAL REPORT.
Hughes Aircraft Co., Culver City, Calif. Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. Space Systems Div.
J. D. Cloud, W. B. Mc Intyre, and T. B. Van Horne. Nov 67, 543p NASA-CR-93488, SSD-68189-5
Contracts NAS7-100, JPL-950056
Prep- Prepared for Jpl

Descriptors: *Flight characteristics, *Spacecraft performance, *Surveyor lunar probes, *Television equipment, Alpha particles, Lunar topography, Postflight analysis, Real time operation, Scattering, Temperature profiles.

For abstract, see STAR 06 09.
N68-18660 HC$3.00 MF$0.65

SURVEYOR SPACECRAFT SYSTEM - SURVEYOR 6 FLIGHT PERFORMANCE FINAL REPORT.
Hughes Aircraft Co., El Segundo, Calif. Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. Space Systems Div.
J. D. Cloud, W. B. Mc Intyre, and T. B. Van Horne. Jan 68, 414p NASA-CR-93495, SSD-68189-6
Contracts NAS7-100, JPL-950056
Prep- Prepared for Jpl

Descriptors: *Flight characteristics, *Spacecraft performance, *Surveyor lunar probes, *Television equipment, *Translational motion, Alpha particles, Postflight analysis, Real time operation, Scattering, Systems analysis, Vernier engines.

For abstract, see STAR 06 09.
N68-18661 HC$3.00 MF$0.65

REUSABLE AEROSPACE PASSENGER TRANSPORT - STUDY OF INCREMENTAL DEVELOPMENT APPROACHES SUMMARY REPORT.

National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
D. W. Fellenz. 15 Apr 67, 21p NASA-TM-X-53595

Descriptors: *Aerospace vehicles, *Reusable spacecraft, *Transportation, Comparison, Economics, Evaluation, Launch vehicle configurations, Manned spacecraft.

For abstract, see STAR 06 09.
N68-18662 HC$3.00 MF$0.65

TECHNOLOGICAL REQUIREMENTS COMMON TO MANNED PLANETARY MISSIONS. APPENDIX C - SUBSYSTEM SYNTHESIS AND PARAMETRIC ANALYSIS.
North American Rockwell Corp., Downey, Calif. Space Div.
R. D. Meston. Jan 68, 238p NASA-CR-73191, SD-67-621-4
Contract NAS2-3918

Descriptors: *Environmental control, *Life support systems, *Manned spacecraft, *Spacecraft communication, *Spacecraft power supplies, *Spacecraft propulsion, Mathematical models, Propellant properties, Space missions, Spacecraft electronic equipment, Thrust-weight ratio.

For abstract, see STAR 06 09.
N68-18698 HC$3.00 MF$0.65

MARINER MARS ABSORPTIVITY STANDARD.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
D. W. Lewis, and T. O. Thostesen. 1 Mar 67, 46p NASA-CR-93489, JPL-TR-32-734
Contract NAS7-100

Descriptors: *Absorptance, *Flat surfaces, *Mariner 4 space probe, *Surface properties, *Temperature control, Aluminum, Paints, Space simulators, Temperature measurement.

For abstract, see STAR 06 09.
N68-18700 HC$3.00 MF$0.65

DEVELOPMENT OF A 425-FOOT DIAMETER PASSIVE COMMUNICATIONS SATELLITE WITH SELF ERECTING PROPERTIES FINAL REPORT.
Schjeldahl (G. T.) Co., Northfield, Minn.
W. Jacobi. 1966, 138p NASA-CR-93423
Contract NAS5-3943

Descriptors: *Communication satellites, *Materials tests, *Passive satellites, *Self erecting devices, Construction materials, Deployment, Glass fibers, Reliability engineering.

For abstract, see STAR 06 09.
N68-18704 HC$3.00 MF$0.65

STUDY OF AN ANIMAL RESEARCH FACILITY (USING S-4B) FOR A MANNED ORBITAL BIOTECHNOLOGY LABORATORY FINAL REPORT.
Douglas Aircraft Co., Inc., Huntington Beach, Calif. Missile and Space Systems Div.
L. T. Kail. Sep 67, 189p NASA-CR-93485, DAC-58039
Contract NAS7-518

Descriptors: *Manned orbital research laboratories, *Research facilities, *Saturn s- 4b stage, *Structural design, Experimental design, Feasibility, Launch vehicle configurations, Life support systems, Mice, Mission planning, Primates, Rats, Swine, Systems engineering.

For abstract, see STAR 06 09.
N68-18706 HC$3.00 MF$0.65

RESEARCH INTO FUNDAMENTAL PHENOMENA ASSOCIATED WITH SPACECRAFT ELECTROCHEMICAL DEVICES - CALORIMETRY OF NICKEL-CADMIUM CELLS PROGRESS REPORT, 1 APR. - 30 JUN. 1967.
American Univ., Washington, D. C.
For primary bibliographic entry see Field 10C.
For abstract, see STAR 06 09.
N68-18709 HC$3.00 MF$0.65

FEASIBILITY AND PARAMETRIC DESIGN STUDY OF THE APPLICATION OF A STATION-KEEPING SYSTEM TO PASSIVE COMMUNICATIONS SATELLITES, PHASE 4 FINAL REPORT.
Westinghouse Electric Corp., Baltimore, Md. Aerospace Div.
Jan 65, 183p NASA-CR-66575, REPT.-1779C
Contract NAS1-3131

Descriptors: *Communication satellites, *Passive satellites, *Solar radiation, *Spacecraft configurations, *Stationkeeping, Gravity gradient satellites, Lens design, Satellite attitude control, Solar sails.

For abstract, see STAR 06 09.
N68-18810 HC$3.00 MF$0.65

FEASIBILITY AND PARAMETRIC DESIGN STUDY OF THE APPLICATION OF A STATION-KEEPING SYSTEM TO PASSIVE COMMUNICATIONS SATELLITES, PHASE 2 FINAL REPORT.
Westinghouse Electric Corp., Baltimore, Md. Aerospace Div.
25 Jun 64, 260p NASA-CR-66574, REPT.-1779A
Contract NAS1-3131

Descriptors: *Communication satellites, *Passive satellites, *Spacecraft design, *Stationkeeping, *Structural weight, Altitude, Attitude control, Diameters, Satellite orbits, Scale models, Solar radiation.

For abstract, see STAR 06 09.
N68-18812 HC$3.00 MF$0.65

WATER PRESSURE AND ACCELERATIONS DURING LANDING OF A DYNAMIC MODEL OF THE APOLLO SPACECRAFT WITH A DEPLOYED-HEAT-SHIELD IMPACT-ATTENUATION SYSTEM.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
S. M. Stubbs. Mar 68, 48p NASA-TN-D-4275
Contract 124-08-04-06-23
Refs Rean- Film Supplement Number L-980 To This Report Is Available on Loan From Nasa. Langley Res. Center

Descriptors: *Apollo spacecraft, *Impact acceleration, *Landing loads, *Water landing, Command modules, Descent trajectories, Heat shielding, Impact tests, Parachute descent, Scale models, Touchdown.

For abstract, see STAR 06 09.
N68-18822 HC$3.00 MF$0.65

DYNAMIC STABILITY OF SPACE VEHICLES. VOLUME 10 - EXIT STABILITY.
General Dynamics Corp., San Diego, Calif.
For primary bibliographic entry see Field 22A.
For abstract, see STAR 06 09.
N68-18825 HC$3.00 MF$0.65

EVALUATION OF THE THERMAL PROPERTIES OF MATERIALS. VOLUME 2 - DATA HANDBOOK FINAL REPORT, 29 JUN. 1965 - 28 JUN. 1966.
Avco Corp., Lowell, Mass. Space Systems Div.
28 Jun 66, 229p NASA-CR-65980, AVSSD-0197-66-RR
Contract NAS9-4874

Descriptors: *Ablative materials, *Honeycomb structures, *Panels, *Spacecraft construction materials, *Thermophysical properties, Adhesives, Environmental tests, High temperature environments, Materials tests, Pressure distribution, Sealers, Thermal insulation, Transient response.

For abstract, see STAR 06 09.
N68-18853 HC$3.00 MF$0.65

DEVELOPMENT OF CHECKOUT SPECIFICATIONS FOR NEW TELEMETER SYSTEMS, PHASE B.
Boeing Co., Seattle, Wash. Space Div.
For primary bibliographic entry see Field 9F.
For abstract, see STAR 06 09.
N68-18979 HC$3.00 MF$0.65

ASTRODYNAMICS, GUIDANCE AND CONTROL REVIEW, NUMBER 1.
National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
For primary bibliographic entry see Field 22C.
For abstract, see STAR 06 09.
N68-18983 HC$3.00 MF$0.65

INITIAL RESULTS OF STUDIES OF HANDLING QUALITIES OF A SIMULATED LUNAR LANDING VEHICLE.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
T. C. Obryan. 1966, 20p NASA-TM-X-57213
Conf- Presented At the Sae Comm. A-18 Meeting on Aerospace Vehicle Flight Control Systems, New Orleans, 19-21 Jan. 1966

Descriptors: *Landing simulation, *Lunar landing, *Training simulators, Attitude control, Flight simulation, Landing loads, Landing speed, Lunar landing modules, Manned spacecraft, Soft landing, Trajectory control.

For abstract, see STAR 06 09.
N68-19030 HC$3.00 MF$0.65

AN ANALYTICAL PROCEDURE FOR PREDICTING THE TWO-DIMENSIONAL IMPACT DYNAMICS OF SPACECRAFT LANDING GEAR.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
J. T. Howlett. Mar 68, 42p NASA-TN-D-4434
Contract 124-08-04-13-23

Descriptors: *Landing gear, *Lunar landing, *Lunar spacecraft, *Mathematical models, *Performance prediction, Dynamic characteristics, Impact loads, Structural members, Struts, Trusses.

For abstract, see STAR 06 09.
N68-19085 HC$3.00 MF$0.65

VOYAGER SPACECRAFT SYSTEM STUDY PHASE B, TASK D. VOLUME 1 - SUMMARY REPORT FINAL TECHNICAL REPORT, 16 JUN. - 16 OCT. 1967.
Boeing Co., Seattle, Wash. Space Div.
Oct 67, 74p NASA-CR-61660, D2-115002-1
Contract NAS8-22602

Descriptors: *Systems analysis, *Systems engineering, *Voyager project, Engineering drawings, Mars (planet), Mission planning, Space missions, Spacecraft configurations, Spacecraft power supplies.

For abstract, see STAR 06 09.
N68-19095 HC$3.00 MF$0.65

VOYAGER SPACECRAFT SYSTEM STUDY PHASE B, TASK D. VOLUME 2 - MISSION/SYSTEM REQUIREMENTS AND ANALYSES FINAL TECHNICAL REPORT, 16 JUN. - 16 OCT. 1967.
Boeing Co., Seattle, Wash.
Oct 67, 268p NASA-CR-93564, D2-115002-2
Contract NAS8-22602

Descriptors: *Ground operational support system, *Mission planning, *Spacecraft configurations, *Systems analysis, *Systems engineering, *Voy-

ager project, Logistics, Mars (planet), Space missions, Trajectory analysis.

For abstract, see STAR 06 09.
N68-19096 HC$3.00 MF$0.65

VOYAGER SPACECRAFT SYSTEM STUDY PHASE B, TASK D. VOLUME 3 - SPACECRAFT FUNCTIONAL DESCRIPTION FINAL TECHNICAL REPORT, 16 JUN. - 16 OCT. 1967.
Boeing Co., Seattle, Wash. Space Div.
Oct 67, 365p NASA-CR-93559, D2-115002-3, V. 3
Contract NAS8-22602

Descriptors: *Earth-mars trajectories, *Performance prediction, *Reliability engineering, *Spacecraft design, *Spacecraft power supplies, *Voyager project, Interfaces, Mission planning, Spacecraft contamination, Spacecraft guidance, Spacecraft maneuvers, Trajectory analysis.

For abstract, see STAR 06 09.
N68-19097 HC$3.00 MF$0.65

VOYAGER SPACECRAFT SYSTEM STUDY PHASE B, TASK D. VOLUME 4 - SELECTED ENGINEERING TASKS FINAL TECHNICAL REPORT.
Boeing Co., Seattle, Wash. Space Div.
Oct 67, 180p NASA-CR-93561, D2-115002-4, V. 4
Contract NAS8-22602

Descriptors: *Imagery, *Spaceborne photography, *Spacecraft contamination, *Systems engineering, *Voyager project, Data processing equipment, Flight tests, Ground operational support system, Mission planning, Payloads, Systems analysis.

For abstract, see STAR 06 09.
N68-19098 HC$3.00 MF$0.65

VOYAGER SPACECRAFT PHASE B, TASK D. VOLUME 4 - ENGINEERING TASKS. BOOK 1 - EFFECT OF CAPSULE RTG'S ON SPACECRAFT FINAL REPORT.
General Electric Co., Philadelphia, Pa. Missile and Space Div.
16 Oct 67, 109p NASA-CR-93563, DIN-67SD4379, V. 4, BK. 1
Contract NAS8-22603

Descriptors: *Radioactive isotopes, *Space capsules, *Spacecraft configurations, *Thermoelectric generators, *Voyager project, Nuclear radiation, Solar generators, Spacecraft electronic equipment, Spacecraft power supplies, Thermal radiation.

For abstract, see STAR 06 09.
N68-19099 HC$3.00 MF$0.65

VOYAGER SPACECRAFT PHASE B, TASK D. VOLUME 1 - SUMMARY FINAL REPORT.
General Electric Co., Philadelphia, Pa. Missile and Space Div.
16 Oct 67, 78p NASA-CR-61661, DIN-67SD4379, V. 1
Contract NAS8-22603

Descriptors: *Mission planning, *Spacecraft configurations, *Systems engineering, *Voyager project, Digital computers, Ground support equipment, Mars atmosphere, Radioactive isotopes, Spacecraft electronic equipment, Thermoelectric generators.

For abstract, see STAR 06 09.
N68-19100 HC$3.00 MF$0.65

VOYAGER SPACECRAFT PHASE B, TASK D. VOLUME 2 - SYSTEM DESCRIPTION. BOOK 1 - GUIDELINES AND STUDY APPROACH, SYSTEM FUNCTIONAL DESCRIPTION FINAL REPORT.
General Electric Co., Philadelphia, Pa. Missile and Space Div.
16 Oct 67, 411p NASA-CR-93550, DIN-67SD4379, V. 2, BK. 1
Contract NAS8-22603

Descriptors: *Interfaces, *Spacecraft configurations, *Systems analysis, *Trajectory analysis, *Voyager project, Experimental design, Payloads, Saturn 5 launch vehicles, Science.

For abstract, see STAR 06 09.
N68-19101 HC$3.00 MF$0.65

VOYAGER SPACECRAFT PHASE B, TASK D. VOLUME 2 - SYSTEM DESCRIPTION. BOOK 2 - TELECOMMUNICATION FINAL REPORT.
General Electric Co., Philadelphia, Pa. Missile and Space Div.
16 Oct 67, 542p NASA-CR-93552, DIN-67SD4379, V. 2, BK. 2
Contract NAS8-22603

Descriptors: *Spacecraft electronic equipment, *Telecommunication, *Voyager project, Command and control, Data storage, Interfaces, Spacecraft configurations, Systems analysis.

For abstract, see STAR 06 09.
N68-19102 HC$3.00 MF$0.65

VOYAGER SPACECRAFT PHASE B, TASK D. VOLUME 2 - SYSTEM DESCRIPTION. BOOK 3 - GUIDANCE AND CONTROL, COMPUTER AND SEQUENCER, POWER SUBSYSTEM, ELECTRICAL SYSTEM FINAL REPORT.
General Electric Co., Philadelphia, Pa. Missile and Space Div.
16 Oct 67, 377p NASA-CR-93539, DIN-67SD4379, V. 2, BK. 3
Contract NAS8-22603

Descriptors: *Digital computers, *Spacecraft guidance, *Spacecraft power supplies, *Systems engineering, *Voyager project, Attitude control, Electric equipment, Liquid sloshing, Sequencing.

For abstract, see STAR 06 09.
N68-19103 HC$3.00 MF$0.65

VOYAGER SPACECRAFT PHASE B, TASK D. VOLUME 2 - SYSTEM DESCRIPTION. BOOK 4 - ENGINEERING MECHANICS, PROPULSION, PLANET SCAN PLATFORM FINAL REPORT.
General Electric Co., Philadelphia, Pa. Missile and Space Div.
16 Oct 67, 448p NASA-CR-93562, DIN-67SD4379, V. 2, BK. 4
Contract NAS8-22603

Descriptors: *Mechanical engineering, *Propulsion system configurations, *Stabilized platforms, *Structural design, *Voyager project, Deployment, Scanners, Spacecraft configurations, Stage separation.

For abstract, see STAR 06 09.
N68-19104 HC$3.00 MF$0.65

VOYAGER SPACECRAFT PHASE B, TASK D. VOLUME 2 - SYSTEM DESCRIPTION. BOOK 5 - FINAL REPORT.
General Electric Co., Philadelphia, Pa. Missile and Space Div.
16 Oct 67, 167p NASA-CR-93558, DIN-67SD4379, V. 2, BK. 5
Contract NAS8-22603

Descriptors: *Ground operational support system, *Prelaunch tests, *Space vehicle checkout program, *Voyager project, Cape kennedy launch complex, Spacecraft configurations, Standardization, Systems engineering, Test equipment.

For abstract, see STAR 06 09.
N68-19105 HC$3.00 MF$0.65

ALTAS AGENA-25 APPLICATIONS TECHNOLOGY SATELLITE-C OPERATIONS SUMMARY.
National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
26 Oct 67, 33p NASA-TM-X-60905, TR-588

Descriptors: *Applications technology satellites, *Communication equipment, *Ground operational support system, *Mission planning, *Preflight operations, Atlas agena launch vehicles, Data acquisition, Flight plans, Meteorological services, Prelaunch tests.

For abstract, see STAR 06 09.
N68-19111 HC$3.00 MF$0.65

VOYAGER SPACECRAFT PHASE B, TASK D. VOLUME 1 - SUMMARY FINAL REPORT.
TRW Systems Group, Redondo Beach, Calif. Voyager Operations Space Vehicles Div.
Oct 67, 56p NASA-CR-61662
Contract NAS8-22604

Descriptors: *Mars (planet), *Spacecraft configurations, *Systems engineering, *Voyager project, Launch windows, Propulsion system configurations, Spacecraft modules, Weight analysis.

For abstract, see STAR 06 09.
N68-19151 HC$3.00 MF$0.65

VOYAGER SPACECRAFT PHASE B, TASK D. VOLUME 2 - SPACECRAFT DESIGN AND PERFORMANCE FINAL REPORT.
TRW Systems Group, Redondo Beach, Calif. Space Vehicles Div.
Oct 67, 241p NASA-CR-93534
Contract NAS8-22604

Descriptors: *Spacecraft configurations, *Structural design, *Systems engineering, *Voyager project, Interplanetary trajectories, Mars (planet), Mission planning, Planetary orbits, Spacecraft modules, Spacecraft performance.

For abstract, see STAR 06 09.
N68-19152 HC$3.00 MF$0.65

VOYAGER SPACECRAFT PHASE B, TASK D. ANNEX TO VOLUME 2 - SPACECRAFT DESIGN AND PERFORMANCE FINAL REPORT.
TRW Systems, Redondo Beach, Calif. Space Vehicles Div.
Oct 67, 539p NASA-CR-93554
Contract NAS8-22604

Descriptors: *Performance prediction, *Reliability engineering, *Spacecraft electronic equipment, *Trajectory analysis, *Voyager project, Mars (planet), Space missions, Spacecraft performance, Systems analysis, Tables (data).

For abstract, see STAR 06 09.
N68-19153 HC$3.00 MF$0.65

VOYAGER SPACECRAFT PHASE B, TASK D. VOLUME 3 - SPACECRAFT MECHANICAL SUBSYSTEMS DEFINITION FINAL REPORT.
TRW Systems Group, Redondo Beach, Calif. Space Vehicles Div.
Oct 67, 280p NASA-CR-93553
Contract NAS8-22604

Descriptors: *Mechanical engineering, *Structural design, *Voyager project, Adapters, Interfaces, Propulsion system configurations, Spacecraft configurations, Systems engineering, Temperature control.

For abstract, see STAR 06 09.
N68-19154 HC$3.00 MF$0.65

VOYAGER SPACECRAFT PHASE B, TASK D. VOLUME 4 - SPACECRAFT ELECTRICAL SUBSYSTEMS DEFINITION FINAL REPORT.
TRW Systems, Redondo Beach, Calif. Space Vehicles Div.
Oct 67, 301p NASA-CR-93549
Contract NAS8-22604

Descriptors: *Electric equipment, *Systems engineering, *Voyager project, Attitude control, Data processing, Electric power transmission, Pyrotechnics, Spacecraft communication, Spacecraft configurations, Spacecraft guidance.

For abstract, see STAR 06 09.
N68-19155 HC$3.00 MF$0.65

VOYAGER SPACECRAFT PHASE B, TASK D. ANNEX TO VOLUME 4 - SPACECRAFT ELECTRICAL SUBSYSTEMS DEFINITION FINAL REPORT.
TRW Systems, Redondo Beach, Calif. Space Vehicles Div.
Oct 67, 57p NASA-CR-93528
Contract NAS8-22604

Descriptors: *Electric equipment, *Systems analysis, *Tradeoffs, *Voyager project, Attitude control, Data processing equipment, Spacecraft communication, Spacecraft configurations, Spacecraft guidance, Systems engineering.

For abstract, see STAR 06 09.
N68-19156 HC$3.00 MF$0.65

VOYAGER SPACECRAFT PHASE B, TASK D. VOLUME 5 - SCIENCE PAYLOAD INTEGRATION FINAL REPORT.
TRW Systems, Redondo Beach, Calif. Space Vehicles Div.
Oct 67, 253p NASA-CR-93538
Contract NAS8-22604

Descriptors: *Experimental design, *Mars atmosphere, *Spacecraft configurations, *Spacecraft television, *Voyager project, Imagery, Mars surface, Payloads, Science, Temperature measurement.

For abstract, see STAR 06 09.
N68-19157 HC$3.00 MF$0.65

VOYAGER SPACECRAFT PHASE B, TASK D. VOLUME 6 - DESIGN ALTERNATIVES AND GROWTH POTENTIAL FINAL REPORT.
TRW Systems, Redondo Beach, Calif. Space Vehicles Div.
Oct 67, 198p NASA-CR-93560
Contract NAS8-22604

Descriptors: *Spacecraft configurations, *Structural design, *Systems engineering, *Voyager project, Alternatives, Mission planning, Propulsion system configurations, Scaling laws, Spacecraft performance.

For abstract, see STAR 06 09.
N68-19158 HC$3.00 MF$0.65

VOYAGER SPACECRAFT PHASE B, TASK D. VOLUME 7 - PRELIMINARY OSE AND MDE FINAL REPORT.
TRW Systems, Redondo Beach, Calif. Space Vehicles Div.
Oct 67, 262p NASA-CR-93536
Contract NAS8-22604

Descriptors: *Ground operational support system, *Systems analysis, *Voyager project, Computer programs, Electric equipment, Flow charts, Space vehicle checkout program.

For abstract, see STAR 06 09.
N68-19159 HC$3.00 MF$0.65

VOYAGER SPACECRAFT PHASE B, TASK D. VOLUME 9 - ENGINEERING STUDY TASK, ETO DECONTAMINATION FINAL REPORT.
TRW Systems, Redondo Beach, Calif. Space Vehicles Div.
Oct 67, 151p NASA-CR-93529
Contract NAS8-22604

Descriptors: *Decontamination, *Freon, *Spacecraft contamination, *Voyager project, Bioengineering, Mars (planet), Spacecraft configurations, Test facilities.

For abstract, see STAR 06 09.
N68-19160 HC$3.00 MF$0.65

VOYAGER SPACECRAFT PHASE B, TASK D. VOLUME 10 - ENGINEERING STUDY TASKS - SHROUD, TEMPERATURE CONTROL, PLUME HEATING FINAL REPORT.
TRW Systems Group, Redondo Beach, Calif. Voyager Operations Space Vehicles Div.
Oct 67, 156p NASA-CR-93525
Contract NAS8-22604

Descriptors: *Plumes, *Shrouds, *Spacecraft configurations, *Systems engineering, *Temperature control, *Voyager project, Spacecraft components, Systems analysis, Temperature effects.

For abstract, see STAR 06 09.
N68-19161 HC$3.00 MF$0.65

FLIGHT VIBRATION DATA OF ASTROBEE 1500, NASA FLIGHT 16.02 FINAL REPORT.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
A. N. Munson. Dec 67, 81p NASA-TM-X-63128, X-321-67-634

Descriptors: *Astrobee 1500 rocket vehicle, *Missile vibration, *Random vibration, *Tables (data), Dynamic response, Flight tests, Graphs (charts), Heat shielding, Structural failure.

For abstract, see STAR 06 09.
N68-19210 HC$3.00 MF$0.65

EVALUATION OF LATERAL-DIRECTIONAL HANDLING QUALITIES OF PILOTED REENTRY VEHICLES UTILIZING A FIXED BASE SIMULATION.
National Aeronautics and Space Administration. Flight Research Center, Edwards, Calif.
F. J. Van Leynseele. Mar 68, 34p NASA-TN-D-4410
Contract 126-16-01-07-24

Descriptors: *Controllability, *Flight simulators, *Lateral stability, *Lifting reentry vehicles, *Roll, *Sideslip, Aerodynamic characteristics, Aircraft performance, Atmospheric entry, Degrees of freedom, Pilot performance.

For abstract, see STAR 06 09.
N68-19226 HC$3.00 MF$0.65

A VENUS LANDER PROBE FOR MANNED FLYBY MISSIONS.
Bellcomm, Inc., Washington, D. C.
P. L. Chandeysson. 23 Feb 68, 28p NASA-CR-93475, TR-68-710-3
Contract NASW-417

Descriptors: *Flyby missions, *Landing modules, *Manned spacecraft, *Venus probes, Planetary landing, Spacecraft design, Spacecraft instruments.

For abstract, see STAR 06 09.
N68-19232 HC$3.00 MF$0.65

INTEGRATED MANNED INTERPLANETARY SPACECRAFT CONCEPT DEFINITION. VOLUME 1 - SUMMARY FINAL REPORT.
Boeing Co., Seattle, Wash. Space Div.
Jan 68, 49p NASA-CR-66558, D2-113544-1
Contract NAS1-6774

Descriptors: *Interplanetary spacecraft, *Manned space flight, *Mission planning, *Nuclear propulsion, Interplanetary flight, Launch vehicle configurations, Manned spacecraft, Modules, Saturn launch vehicles, Space exploration.

For abstract, see STAR 06 09.
N68-19238 HC$3.00 MF$0.65

INTEGRATED MANNED INTERPLANETARY SPACECRAFT CONCEPT DEFINITION. VOLUME 6 - COST EFFECTIVE SUBSYSTEM SELECTION AND EVOLUTIONARY DEVELOPMENT.
Boeing Co., Seattle, Wash. Space Div.
Jan 68, 288p NASA-CR-66564, D2-113544-6
Contract NAS1-6774

Descriptors: *Interplanetary spacecraft, *Manned space flight, *Spacecraft design, *Systems engineering, Earth-mars trajectories, Mission planning, Nuclear propulsion, Space exploration, Spacecraft modules, Venus (planet).

For abstract, see STAR 06 09.
N68-19247 HC$3.00 MF$0.65

INTEGRATED MANNED INTERPLANETARY SPACECRAFT CONCEPT DEFINITION. VOLUME 4 - SYSTEM DEFINITION FINAL REPORT.
Boeing Co., Seattle, Wash. Space Div.
Jan 68, 560p NASA-CR-66562, D2-113544-4
Contract NAS1-6774

Descriptors: *Interplanetary spacecraft, *Manned space flight, *Nuclear propulsion, *Spacecraft design, Ground support equipment, Interplanetary flight, Launch vehicle configurations, Mission planning, Saturn launch vehicles, Spacecraft modules, Systems engineering.

For abstract, see STAR 06 09.
N68-19248 HC$3.00 MF$0.65

INTEGRATED MANNED INTERPLANETARY SPACECRAFT CONCEPT DEFINITION. VOLUME 3 - SYSTEM ANALYSIS. PART 2 - EXPERIMENT PROGRAM FINAL REPORT.
Boeing Co., Seattle, Wash. Space Div.
Jan 68, 328p NASA-CR-66561, D2-113544-3-2
Contract NAS1-6774

Descriptors: *Interplanetary spacecraft, *Manned space flight, *Payloads, Earth-mars trajectories, Human factors engineering, Manned spacecraft, Mission planning, Nuclear propulsion, Space exploration, Spacecraft design, Systems engineering, Venus (planet).

For abstract, see STAR 06 09.
N68-19249 HC$3.00 MF$0.65

MERCURY/ GEMINI PROGRAM DESIGN SURVEY. NASA/ERC DESIGN CRITERIA PROGRAM STABILITY, GUIDANCE AND CONTROL.
Mcdonnell-douglas Co., St. Louis, Mo.
31 Jan 68, 216p NASA-CR-86041, F917
Contract NAS12-586

Descriptors: *Control stability, *Gemini project, *Guidance sensors, *Mercury project, *Spacecraft guidance, Attitude control, Documentation, Project management, Spacecraft control, Spacecraft design, Systems engineering.

For abstract, see STAR 06 09.
N68-19250 HC$3.00 MF$0.65

EXPLORATORY STUDY OF HYPERGOLIC IGNITION SPIKE PHENOMENA, PHASE 2, PART 2, JULY 1 TO SEPTEMBER 30, 1966.

Bureau of Mines, Pittsburgh, Pa. Explosives Research Center.
For primary bibliographic entry see Field 21I.
For abstract, see STAR 06 09.
N68-19268 HC$3.00 MF$0.65

PRELIMINARY DESIGN FOR A RUGGEDIZED IMAGING SYSTEM FINAL ENGINEERING REPORT, 9 JAN. - 11 AUG. 1967.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. Ryan Aeronautical Co., San Diego, Calif.
For primary bibliographic entry see Field 9B.
For abstract, see STAR 06 09.
N68-19320 HC$3.00 MF$0.65

EXPERIMENT PAYLOADS FOR MANNED ENCOUNTER MISSIONS TO MARS AND VENUS.
Bellcomm, Inc., Washington, D. C.
G. A. Briggs, P. L. Chandeysson, M. Cutler, E. M. Grenning, and W. D. Grobman. 21 Feb 68, 65p NASA-CR-93569, TR-68-710-2
Contract NASW-417

Descriptors: *Manned space flight, *Mars (planet), *Mission planning, *Payloads, *Venus (planet), Flyby missions, Manned spacecraft, Space exploration, Space missions.

For abstract, see STAR 06 09.
N68-19354 HC$3.00 MF$0.65

THE POTENTIAL OF OBSERVATION OF THE OCEANS FROM SPACECRAFT.
General Electric Co., Philadelphia, Pa. Missile and Space Div.
For primary bibliographic entry see Field 8J.
PB-177 726 HC$3.00 MF$0.65

A PROPOSED METHOD OF ESTIMATING CLOUD-TOP TEMPERATURE, CLOUD COVERS, EMISSIVITY, AND CLOUDNESS FROM SHORT- AND LONG WAVE RADIATION DATA OBTAINED BY MEDIUM-RESOLUTION SCANNING RADIOMETERS,
Chicago Univ., Ill. Satellite and Mesometeorology Research Project.
For primary bibliographic entry see Field 4B.
PB-177 752 HC$3.00 MF$0.65

22C. Spacecraft Trajectories and Reentry

AN ANALYSIS OF THE GSFC LASER RANGING DATA.
Wolf Research and Development Corp., Bladensburg, Md. Applied Sciences Dept.
For primary bibliographic entry see Field 20E.
For abstract, see STAR 06 09.
N68-18507 HC$3.00 MF$0.65

ON THE MOTION OF REMOTE ARTIFICIAL EARTH'S SATELLITES IN THE GRAVITATIONAL FIELDS OF THE EARTH AND OF THE MOON.
O Dvizhenii Dalekikh Isz V Bravitatsionnom Pole Zemli I Luny
Volt Technical Corp., Washington, D. C.
V. P. Dolgachev. 10 Mar 68, 9p NASA-CR-93436, ST-CM-10687
Contract NAS5-12487
Tran- Transl. Into English From Vestn. Mosk. Univ. Astron. (Moscow), No. 1, 1968 P 94-100

Descriptors: *Artificial satellites, *Earth-moon system, *Gravitational fields, *Satellite perturbation, Abnormalities, Elliptical orbits, Fourier series, Harmonic functions, Lagrange coordinates, Numerical analysis.

For abstract, see STAR 06 09.
N68-18710 HC$3.00 MF$0.65

SIMPLIFIED MIDCOURSE GUIDANCE TECHNIQUES.
Massachusetts Inst. of Tech., Cambridge. Experimental Astronomy Lab.
G. L. Slater, and R. G. Stern. Feb 66, 16p NASA-CR-70791, RE-18
Grant NSG-254-62
Conf- Presented At the Aiaa Natl. Meeting, Baltimore, Md., 3 Mar. 1966 Subm- Submitted for Publication

Descriptors: *Midcourse guidance, *Onboard equipment, *Spacecraft guidance, Accuracy, Equations of motion, Linearization, Mathematical models, Orbit perturbation, Simplification.

For abstract, see STAR 06 09.
N68-18730 HC$3.00 MF$0.65

DYNAMIC STABILITY OF SPACE VEHICLES. VOLUME 7 - THE DYNAMICS OF LIQUIDS IN FIXED AND MOVING CONTAINERS.
General Dynamics Corp., San Diego, Calif.
L. L. Fontenot. Mar 68, 149p NASA-CR-941, GDC-BTD67-056
Contract NAS8-11486
Coll- 149 P Refs

Descriptors: *Control stability, *Hydrodynamic equations, *Liquid propellant rocket engines, *Liquid sloshing, *Spacecraft control, Dynamic stability, Equations of motion, Fluid mechanics, Perturbation theory.

For abstract, see STAR 06 09.
N68-18769 HC$3.00 MF$0.65

FEASIBILITY AND PARAMETRIC DESIGN STUDY OF THE APPLICATION OF A STATION-KEEPING SYSTEM TO PASSIVE COMMUNICATIONS SATELLITES, PHASE 4 FINAL REPORT.
Westinghouse Electric Corp., Baltimore, Md. Aerospace Div.
For primary bibliographic entry see Field 22B.
For abstract, see STAR 06 09.
N68-18810 HC$3.00 MF$0.65

ASTRODYNAMICS, GUIDANCE AND CONTROL REVIEW, NUMBER 1.
National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala. 21 Feb 68, 45p NASA-TM-X-53709

Descriptors: *Control equipment, *Launch vehicles, *Numerical analysis, *Optimal control, *Spacecraft control, *Spacecraft electronic equipment, *Spacecraft guidance, Computer programs, Computers, Differential equations, Interplanetary flight, Trajectory analysis.

For abstract, see STAR 06 09.
N68-18983 HC$3.00 MF$0.65

VOYAGER SPACECRAFT SYSTEM STUDY PHASE B, TASK D. VOLUME 3 - SPACECRAFT FUNCTIONAL DESCRIPTION FINAL TECHNICAL REPORT, 16 JUN. - 16 OCT. 1967.
Boeing Co., Seattle, Wash. Space Div.
For primary bibliographic entry see Field 22B.
For abstract, see STAR 06 09.
N68-19097 HC$3.00 MF$0.65

ESTIMATION OF INERTIAL PLATFORM ERRORS.
Philco-ford Corp., Palo Alto, Calif. Space and Reentry Systems Div.
For primary bibliographic entry see Field 17G.
For abstract, see STAR 06 09.
N68-19163 HC$3.00 MF$0.65

GUIDANCE, FLIGHT MECHANICS AND TRAJECTORY OPTIMIZATION. VOLUME 12 - RELATIVE MOTION, GUIDANCE EQUATIONS FOR TERMINAL RENDEZVOUS.
North American Aviation, Inc., Downey, Calif.
D. F. Bender, and A. L. Blackford. Apr 68, 97p NASA-CR-1011, SID-66-1678-4
Contract NAS8-11495
Coll- 97 P Refs

Descriptors: *Equations of motion, *Spacecraft docking, *Spacecraft guidance, Flight mechanics, Interception, Orbital elements, Rendezvous, Rendezvous guidance, Rendezvous trajectories.

For abstract, see STAR 06 09.
N68-19186 HC$3.00 MF$0.65

FLIGHT VIBRATION DATA OF ASTROBEE 1500, NASA FLIGHT 16.02 FINAL REPORT.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
For primary bibliographic entry see Field 22B.
For abstract, see STAR 06 09.
N68-19210 HC$3.00 MF$0.65

SIMPLE PROCESSORS OF STAR TRACKER COMMANDS FOR STABILIZING AN INERTIALLY ORIENTED SATELLITE.
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
For primary bibliographic entry see Field 17G.
For abstract, see STAR 06 09.
N68-19236 HC$3.00 MF$0.65

INTEGRATED MANNED INTERPLANETARY SPACECRAFT CONCEPT DEFINITION. VOLUME 3 - SYSTEM ANALYSIS. PART 1 - MISSIONS AND OPERATIONS FINAL REPORT.
Boeing Co., Seattle, Wash. Space Div.
Jan 68, 270p NASA-CR-66560, D2-113544-3-1
Contract NAS1-6774

Descriptors: *Earth-mars trajectories, *Interplanetary spacecraft, *Manned space flight, *Trajectory optimization, Mission planning, Nuclear propulsion, Orbit calculation, Space exploration, Trajectory control, Transfer orbits, Venus (planet).

For abstract, see STAR 06 09.
N68-19239 HC$3.00 MF$0.65

WORKING WITH ORBITS.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
D. E. Gerster. Feb 68, 20p NASA-TM-X-63126, X-207-67-434
Rean- Revised

Descriptors: *Apogees, *Gravitational effects, *Orbit calculation, *Perigees, *Satellite orbits, Angular momentum, Mathematical models, Orbital mechanics, Orbital velocity.

For abstract, see STAR 06 09.
N68-19242 HC$3.00 MF$0.65

GUIDANCE, FLIGHT MECHANICS AND TRAJECTORY OPTIMIZATION. VOLUME 13 - NUMERICAL OPTIMIZATION METHODS.
North American Aviation, Inc., Downey, Calif.
J. E. Mc Intyre. Mar 68, 109p NASA-CR-1012, SID-66-1678-5
Contract NAS8-11495
Coll- 109 P Refs

Descriptors: *Ascent trajectories, *Mayer problem, *Numerical analysis, *Trajectory optimization, Flight mechanics, Flight optimization, Mathematical models, Steepest descent method.

For abstract, see STAR 06 09.
N68-19315 HC$3.00 MF$0.65

VENUS SWINGBY TRAJECTORIES, ESTIMATION OF INERTIAL PLATFORM ERRORS, INTERPLANETARY NAVIGATION AND GUIDANCE ANALYSIS.
Philco-ford Corp., Palo Alto, Calif. Space and Reentry Systems Div.
21 Oct 67, 141p NASA-CR-61646, TR-DA1568
Contract NAS8-20358

Descriptors: *Inertial platforms, *Interplanetary flight, *Spacecraft guidance, *Trajectory analysis, *Venus (planet), Ascent trajectories, Computer programs, Equations of motion, Error analysis, Manuals, Mars (planet), Planet ephemerides.

For abstract, see STAR 06 09.
N68-19316 HC$3.00 MF$0.65

EFFECT OF EARTH OCCULTATION ON ASTRONOMICAL OBSERVATIONS FROM EARTH ORBIT.
Bellcomm, Inc., Washington, D. C.
For primary bibliographic entry see Field 3A.
For abstract, see STAR 06 09.
N68-19353 HC$3.00 MF$0.65

LUNAR SOLAR PERTURBATIONS OF A 24 HOUR SATELLITE.
National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
B. K. Martynenko. 28 Dec 67, 29p NASA-TM-X-60931, RSIC-740
Sci. Inform. Center Date- 28 Dec. 1967 Coll- 29 P Refs Tran- Transl. Into English From Inst. Teor. Astron., Biulleten, V. 11, No. 1, 1967 P 33-47 Spon- Sponsored Jointly By Nasa and Army Missile Command

Descriptors: *Eccentricity, *Lunar gravitational effects, *Satellite perturbation, *Solar gravitation, *Twenty-four hour orbits, Artificial satellites, Long term effects, Orbital elements, Periodic variations.

For abstract, see STAR 06 09.
N68-19355 HC$3.00 MF$0.65

ACCELERATION HODOGRAPH ANALYSIS TECHNIQUES FOR POWERED ORBITAL TRAJECTORIES, PHASE 3 FINAL REPORT.
General Electric Co., Philadelphia, Pa. Missile and Space Div.
S. P. Altman. 20 Jun 67, 291p NASA-CR-61616, DIN-67SD4300
Contract NAS8-20360

Descriptors: *Equations of motion, *Hodographs, *Trajectory analysis, *Vector spaces, Acceleration (physics), Functions (mathematics), Mission planning, Orbit calculation, Orbital mechanics, Transformations (mathematics), Velocity distribution.

For abstract, see STAR 06 09.
N68-19376 HC$3.00 MF$0.65

22D. Spacecraft Launch Vehicles and Ground Support

ON MINIMIZATION OF TRAJECTORY SENSITIVITY,
Grumman Aircraft Engineering Corp Bethpage NY Research Dept
Eliezer Kreindler. Mar 68, 18p Rept no. RE-320J
Availability: To be published in the International Journal on Control, 18p n.d.

Descriptors: (*Launch vehicles (Aerospace), *Control systems), (*Trajectories, Sensitivity), Aerodynamic control surfaces, Pressure, Linear systems, Optimization, Feedback, Servomechanisms, Operations research, Partial differential equations, Matrix algebra.
Identifiers: Closed-loop control systems, *Trajectory sensitivity.

Explores the engineering potential of incorporating quadratic sensitivity terms in linear optimization problems as a means of sensitivity reduction to plant-parameter deviations in linear feedback control systems. The sensitivity problem is of great practical importance because the parameters entering the mathematical model of the system to be controlled (the plant) are either not exactly known or are subject to change due to various internal and external influences. For example, most of the parameters which enter the equations for airframe dynamics depend on the dynamic pressure. The theoretical part of the investigation is fairly complete but more numerical experimentation is needed to determine whether the complications of the optimization problem augemented by the sensitivity terms are justified by the reduction in sensitivity obtained. It is felt that the method discussed in this report might very well be of value in critical cases, such as the control of a large booster, where even a limited reduction of sensitivity justifies some additional design effort and a somewhat more complicated controller. (Author)
AD-666 825 Not available from CFSTI.

COMPUTING PROGRAM FOR AXIAL DISTRIBUTION OF AERODYNAMIC NORMAL-FORCE CHARACTERISTICS FOR AXISYMMETRIC MULTISTAGE LAUNCH VEHICLES.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
R. B. Madden. Mar 68, 126p NASA-TN-D-4342
Contract 124-08-25-25-23

Descriptors: *Axisymmetric bodies, *Computer programs, *Fortran, *Launch vehicle configurations, *Multistage rocket vehicles, Aerodynamic characteristics, Aeroelasticity, Angle of attack, Computer programming, Computerized simulation, Data reduction, Logic design.

For abstract, see STAR 06 09.
N68-18615 HC$3.00 MF$0.65

REQUIREMENTS SPECIFICATION PART 1 AND ANALYSIS OF DYNAMIC SIMULATION METHODS FOR LAUNCH VEHICLE COMPONENT LEVEL SIMULATION.
General Electric Co., Daytona Beach, Fla. Apollo Support Dept.
Mar 66, 153p NASA-CR-61624
Contract NAS8-20060

Descriptors: *Computer programs, *Computerized simulation, *Launch vehicles, *Specifications, Ground support equipment, Requirements, Systems engineering.

For abstract, see STAR 06 09.
N68-18832 HC$3.00 MF$0.65

ASTRODYNAMICS, GUIDANCE AND CONTROL REVIEW, NUMBER 1.
National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
For primary bibliographic entry see Field 22C.
For abstract, see STAR 06 09.
N68-18983 HC$3.00 MF$0.65

SATURN 5 MANUAL BACKUP GUIDANCE AND CONTROL PILOTED SIMULATION STUDY.
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
For primary bibliographic entry see Field 17G.
For abstract, see STAR 06 09.
N68-19061 HC$3.00 MF$0.65

VOYAGER SPACECRAFT PHASE B, TASK D. VOLUME 4 - ENGINEERING TASKS. BOOK 2 - APPLICABILITY OF APOLLO CHECKOUT EQUIPMENT FINAL REPORT.
General Electric Co., Philadelphia, Pa. Missile and Space Div.
16 Oct 67, 223p NASA-CR-93565, DIN-67SD4379, V. 4, BK. 2
Contract NAS8-22603

Descriptors: *Checkout, *Ground support equipment, *Voyager project, Apollo project, Electric equipment, Saturn launch vehicles, Spacecraft configurations, Spacecraft launching.

For abstract, see STAR 06 09.
N68-19091 HC$3.00 MF$0.65

OPERATIONS AND MAINTENANCE MANUAL UPRATED SATURN 1 AND SATURN 5 VEHICLE STAGE PRESSURIZED LIGHTING SYSTEM.
National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
30 Dec 67, 52p NASA-TM-X-60906, TM-542

Descriptors: *Ground support equipment, *Lighting equipment, *Maintenance, *Manuals, Fluorescence, Nitrogen, Pressurizing, Saturn 1 launch vehicles, Saturn 5 launch vehicles.

For abstract, see STAR 06 09.
N68-19110 HC$3.00 MF$0.65

CENTAUR IN RETROSPECT - A TECHNICAL SURVEY OF THE CENTAUR INERTIAL GUIDANCE SYSTEM EVOLUTION FROM 1959 TO 1967.
Honeywell, Inc., St. Petersburg, Fla. Aerospace Div.
Jan 68, 781p NASA-CR-86040, HONEYWELL-R-ED-27290
Contract NAS12-587

Descriptors: *Centaur launch vehicle, *Inertial guidance, *Spacecraft design, Computer components, Decision making, Ground support equipment, Inertial platforms.

For abstract, see STAR 06 09.
N68-19164 HC$3.00 MF$0.65

SENSITIVITY DESIGN TECHNIQUE FOR OPTIMAL CONTROL, PART C FINAL REPORT.
Rensselaer Polytechnic Inst., Troy, N. Y.
For primary bibliographic entry see Field 9C.
For abstract, see STAR 06 09.
N68-19267 HC$3.00 MF$0.65

*U. S. GOVERNMENT PRINTING OFFICE : 1968 305-095/21

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3A	N68-19344	21H	N68-19448	13B	PB-177 697	5G	PB-177 775
20L	N68-19347	12A	N68-19449	8M	PB-177 698	13F	PB-177 779
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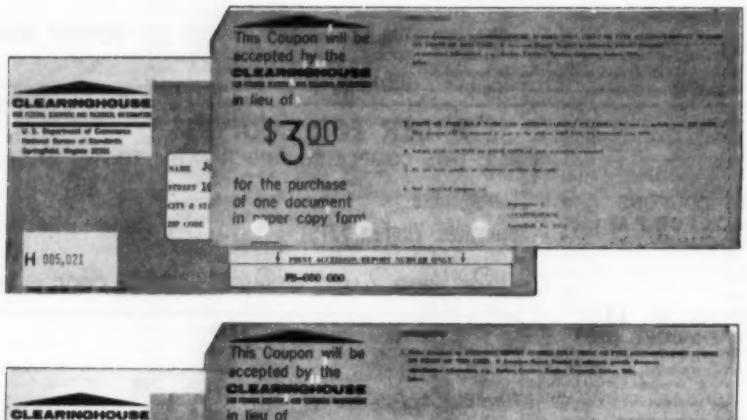

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